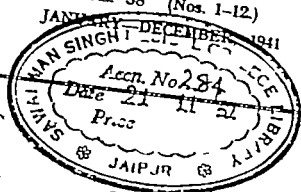


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ERRATUM.

Vol. 36, No. 4 p. 212, line 15 *for* Prepare peptone-agar of composition —peptone 40 gm. sod. chloride 80 gm. water 4,000 cc.
read Prepare peptone-agar of composition —peptone 40 gm. sod. chloride 20 gm. agar 80 gm. water 4,000 cc.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

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[No 1

SUMMARY OF RECENT ABSTRACTS*

I CHOLERA.

Epidemiology

In Bengal LAL (p 717) shows that endemic regions of cholera lie chiefly along the lower reaches of the river Hooghly and that in the non-endemic regions there is only a low degree of epidemic visitation the trend of cholera mortality appears to be declining in many areas. Little support was found for the theory that a critical level of absolute humidity is a determining factor in the forecasting of epidemics.

Actiology

SEAL (p 278) has found advantage in a bismuth-sulphite medium (of which details are given) over alkaline peptone water for the isolation of *V. cholerae*.

LAHIRI *et al* (p 718) have tested the viability of true cholera vibrios in natural waters using for the purpose freshly isolated vibrios of the Inaba type. The results varied according to the source of the water from one hour up to 18 days and the vibrios lived longer in autoclaved and filtered waters than in raw waters. SOPARKAR (p 277) found viable *V. cholerae* in only 2 of 60 flies tested up to 4 hours after ingestion but the vibrios could be isolated from faecal and vomit spots in a large number of cases during the first 8 hours after feeding and occasionally up to 24 hours.

BAARS (p 718) has carried further his studies on the breaking down of glucose by the cholera and El Tor vibrios under both aerobic and anaerobic conditions. The El Tor vibrio ferments glucose more energetically than the cholera vibrio.

PARRICHA *et al* (p 276) found that 10.7 per cent of 438 vibrios from cases of cholera were not agglutinated by Inaba O, Ogawa O or Inaba HO sera. In an examination of 219 strains of vibrios from cases of cholera, healthy persons and water, all non-agglutinable by O serum [and therefore not *V. cholerae*]. AHUJA and SINGH (p 277) found that 35.5 per cent. possessed H antigen partly or completely identical with that of *V. cholerae*. VENKATRAMAN (p 277) shows that in Madras

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

none of a series of vibrios isolated from water was agglutinated by O serum of group 1 Gardner and Venkatraman, and also that in Madura city which had been free from cholera for a year no vibrios isolated from stools of 8,301 residents were agglutinated by that serum.

GENEVRAY (p. 717) has studied the dissociation of the cholera vibrio in peptone water under the influence of chlorine. The dose of free chlorine in excess was 2.6 mgm. per 10 cc. peptone water and this was allowed to act for 45 minutes after which time sub-cultures were made into fresh peptone water. After this process had been repeated three times colonies on solid media were of two kinds, one dry and wrinkled, the other translucent and smooth like the colonies normally seen. The wrinkled colonies were shown to be those of true *V. cholerae*. He further (p. 717) succeeded in producing similar dissociation by means of phenol, and shows (p. 718) that the wrinkled colonies obtained by both methods were the same. They differed from the smooth colonies in macroscopic characters and in increase of proteolytic powers in macroscopic characters and in increase of chlorine-releasing powers. The wrinkled type reverted to the smooth type on repeated subculture and is therefore a variant and not a mutation.

WHITE (p. 719) has found that the gelatinous intercellular substance characteristic of cultures of rugose vibrio variants, contains a haptene reacting specifically with whole rugose cultures, and with antisera to certain rugose extracts. He (p. 720) describes the antigenic properties of a heat-labile somatic protein obtained from vibrios. Injection of this protein into animals provokes, in a proportion of cases, the formation of precipitins, and it is thought that the substance has a somatic rather than a flagellar origin.

RAYNAL *et al.* (p. 720) have found that the activity of trichloroacetic acid extracts of different strains of *V. cholerae* is directly correlated with the virulence of the strain used, and that strains recently isolated from severe cases of the disease are those best suited to furnish antigens having specific toxic and antigenic characters. DANBOVICZKY and BARBER (p. 721) have also worked with a trichloroacetic acid extract of *V. cholerae* which shows toxic, antigenic and allergic characters. They give the biochemical reactions of the extract and conclude that it is a glucosidic lipid complex containing amino-nitrogen and phosphorus.

Pathology

SOLARIKO (p. 281) has shown experimentally first that cholera vibrios can pass through the buccopharyngeal mucous membrane of rabbits and can be transported by the lymphatic and blood stream to the intestine and second, that the vibrios can withstand the acidity of the gastric juice and can pass on alive through the stomach to the intestine.

CHATTERJEE (p. 278) has found that when *V. cholerae* is grown in synthetic medium, histidine in the medium is completely transformed into histamine and he draws attention to the fact that changes in tissues and organs of cholera patients resemble those produced by histamine. He (p. 282) contributes a further study on the pathology of cholera. The condition in organs other than the gastro-intestinal tract and lymph glands consists mainly of dilatation of the capillaries. There is bile stasis, probably due to a nervous mechanism. Cholera

shock probably does not depend on dehydration alone but is also due to this great dilatation of capillaries in various organs. The author suggests that the symptom complex of cholera is the result of an allergic state rather than of toxæmia or acute inflammation. In an editorial in the *Calcutta Medical Journal* it is remarked that specific hypersensitiveness in epidemic diseases is not easy to imagine and that the theory that the symptoms of cholera are explained by the production of histamine in the alimentary canal is more attractive. It is however probable that the effects of the vibrio are due to specific toxins elaborated in the intestinal wall.

Treatment and Control

HIGGINS (p 282) describes an emergency method of treatment organized in Shanghai during an epidemic in warrefugees. This consists of a single massive infusion of normal saline, at a rate of 2 litres an hour continued until the pulse is reasonably good and until the body temperature rise approaches normal. The patients lie on string cots and defæcate into large pans beneath and no other treatment is given. Reactions are common but are disregarded and clinical improvement is rapid with few relapses. The death rate in one emergency hospital was 7 per cent. Diagnosis was made on the presence of painless purging dehydration rice-water stools and aphonia.

IDR (p 723) states that in Japan cholera occurs only as a result of importation from China where it is epidemic every year. In 1939 no actual cases were imported into Japan but carriers were. These persons were in apparently good health when admitted and it was possible to trace them to their destinations. This discovery of carriers however, led to a new quarantine regulation by which passengers are only allowed to land after the result of stool examination is known instead of as previously on collection of the stool.

Studies on the hæmolytic power of vibrios and on the Celebes and El Tor vibrios

AIDA (p 719) notes that repeated subculture appears to weaken both the milk-coagulating and the hæmolytic power of cholera and cholera-like vibrios [this is not in accordance with the work of DEL FAVEKO (this Bulletin, 1939 Vol 39 p 374) who found that laboratory strains of *V. cholerae* kept for 15 passages at 20°C became strongly hæmolytic].

The hæmolytic power of *V. cholerae* is discussed by MERTENS (p 279) who shows that stringent conditions must be laid down before the test can be regarded as completely valid. With salt concentration of 0.85 per cent. the use of 5 per cent. erythrocytes, and at pH 4 to 9 a reading after 2 hours gives safe results but late hæmolysis is given by simple uninoculated bouillon in 8 or 9 days. Unwashed corpuscles resist hæmolysis there are distinct differences in the occurrence of hæmolysis at 26°C. and at 37°C. and shaking the vibrios with blood gives better contact and promotes hæmolysis. He points out that at room temperature thick suspensions of 24 hour agar colonies of *V. cholerae* can give hæmolysis in 24 hours. Discussing the hæmolytic power of the cholera El Tor and Celebes vibrios MERTENS and BREUWER (p 721) begin by quoting a finding of Mertens (above) that 24 of 28 very thick suspensions of *V. cholerae* were capable of

causing haemolysis of once-washed erythrocytes of goat's blood. It therefore becomes a matter of importance to determine if haemolytic power in the case of *V. cholerae* is merely a matter of degree of concentration, as it appears to be, and to ensure that in comparisons of this power in the different vibrios uniform standards and methods of testing are applied. The author's findings were as follows: (1) The centrifuged supernatant fluid of thick suspensions of all strains of El Tor, most strains of Celebes, and some strains of cholera was haemolytic and the haemolysin was thermostable. (2) The precipitate obtained from the supernatant fluid with 96 per cent. acetone alcohol showed no haemolytic character in the case of cholera. Little in the case of Celebes and definite haemolytic power in the majority of El Tor strains. When haemolytic power was present it was not altered by heating. (3) Nutrient bouillon sown with vibrios incubated for one or two days and centrifuged showed the supernatant-fluid acetone-alcohol precipitate to be non-haemolytic for cholera and both strongly haemolytic and thermostable for all strains of El Tor and Celebes.

GISBERG (p. 280) discusses the relationship of the cholera El Tor and Celebes vibrios and concludes that the only two recognized differentiating tests are the haemolysis test and the Voges-Proskauer reaction. He describes, however, a third test—heating suspensions of *V. cholera* in saline to 56°C. for 3 hours renders the vibrios inagglutinable, but has no such effect on the El Tor and Celebes vibrios, which must be heated to 80°C. before agglutinability is destroyed. In general characters and chemical structure the El Tor vibrio occupies a position intermediate between the cholera vibrio and the non-agglutinable vibrios.

DE MOOR (p. 279) discusses the outbreak of cholera in Celebes which was caused by an El Tor vibrio belonging to the Gardner and Venkatraman sub-group O 1 to the Hedberg type 1 to the Ogawa serological strain and which was haemolytic to goat cells. The El Tor vibrio has been regarded as non-pathogenic but the author points out that this strain has only weak haemolytic power when freshly isolated, and suggests that in previous instances epidemics may have been caused by the El Tor vibrio and that it has been on this account regarded as the true *V. cholerae*. MARRAS (p. 722) on the other hand regards the El Tor vibrio as a non-pathogenic contaminating organism local to the Hedjaz. He finds that it possesses a non-specific O agglutinationic group identical with the Inaba vibrio but whereas the El Tor vibrio gives a positive Voges-Proskauer reaction the Inaba, Ogawa and Colle vibrios are negative. Since, in his opinion, the El Tor vibrio is non-pathogenic the author states that it cannot be identical with the Celebes vibrio.

Discussing the Celebes outbreak DE VOGEL (p. 723) brings out certain points. Examination of 2,264 samples of faeces from different parts of the island during 1938 failed to reveal any vibrios which agglutinated with cholera serum. No El Tor vibrio has ever been isolated outside the regions attacked. After the last case of El Tor cholera at Macassar in April 1938 no more El Tor vibrios were found although several patients in the regions previously attacked, and suffering from cholera-like disease, were bacteriologically examined.

TAKITA (p. 281) claims to have obtained a powerful and specific exotoxin from haemolytic strains of the El Tor vibrio. This toxin, which is lethal to laboratory animals, differs from the haemolysin although it is produced by haemolytic strains only. Toxoid may be

Sprue and Idiopathic Steatorrhoea

produced and has antigenic property. Fresh sera of animals will neutralize the toxin but this power is lost on heating to 56°C for 30 minutes. Specific immune serum can be heated to 60°C. for 30 minutes without loss of power.

Charles Wilcocks

SPRUE AND IDIOPATHIC STEATORRHOEA

PRÉCIS OF ABSTRACTS IN THIS SECTION

MANSON BARR (p 7) discusses the tongue in sprue and the mouth lesions in other conditions and expresses the view that there is no essential observable difference between the glossitis and stomatitis of sprue and those of fully developed, or of so-called larval pellagra. In cases of sprue treated with nicotinic acid the glossitis subsided in three days but the effect on the intestinal symptoms was more difficult to assess and the megalocytic anaemia was not improved. Nicotinic acid treatment (which should be continued for at least 3 months) is the most satisfactory treatment of sprue glossitis but riboflavin may be added where angular stomatitis is present.

The main defect in sprue is probably lack of absorption from the small intestine but of this there is no direct microscopical evidence. Other diseases, such as ulceration of the ileum give rise to a condition which resembles sprue. As in pernicious anaemia the intrinsic factor is absent but the clinical course of the disease continues whatever the state of the gastric juice. In sprue complete clinical and haematological recovery frequently takes place. It is claimed that a clinical condition of larval sprue exists in which the glossitis and stomatitis persist for as much as a year before the disease is fully established. The mouth lesions of pernicious anaemia are similar to those of sprue and the two diseases are closely related. Cord lesions have been observed in sprue. Nicotinic acid has been used with success in cord lesions associated with glossitis.

Idiopathic steatorrhoea is distinct from sprue but the glossitis is amenable to nicotinic acid though not so completely as that of sprue. Pellagrous dermatitis has been observed in sprue and there is probably a relative C avitaminosis in sprue.

The conclusion is that there is a common link between these various diseases, and that it may be impossible to make an absolute diagnosis where the clinical picture embraces features of several of them. Since sprue originates only in the tropics local conditions probably exert some decisive influence. Finally it is concluded that the glossitis of these conditions is a sign of avitaminosis B.

BENNETT and HARDWICK (p 7) discuss the results of failure of function of the small intestine which produces a syndrome of steatorrhoea, tetany and macrocytic anaemia with stomatitis and pellagrous skin lesions. Various other clinical and biological changes are noted and it is emphasized that sprue may have a very long latent period. Two examples are given of a syndrome indistinguishable from tropical sprue appearing in residents of a non tropical country. Defective

absorption from the small intestine is the cause of the condition fat and sugar are not absorbed normally and poor absorption of salts causes tetany and defective ossification defective absorption of iron and of the extrinsic factors result in anaemia. There is deficiency in vitamins A, B, C, D, E and K or P. Gastro-colic fistula produces similar symptoms.

VEDRIS (p. 12) traces the stages of sprue from the fundamental failure of absorption of food from the small intestine. There is failure to absorb fat, sugar, salts and vitamins. He postulates, however, that this failure of absorption is itself due to a functional failure of anterior pituitary secretion precipitated in some individuals by tropical service but admits that no proof of this has been afforded.

POCK SYLVE (p. 13) suggests that the two main factors in the production of sprue are histamine intoxication and loss of vitamin B₁₂. He designates the sprue-like diseases incipient sprue which may go on to pro-sprue or pseudo-sprue, either of which may lead to anatomical sprue. Metabolic sprue arises from adrenal insufficiency due to climatic factors and this leads either to histamine toxæmia or to activation of phosphorylating ferments which interfere with absorption and lead to pro-sprue. Histamine toxæmia leads to incipient sprue. Enterogenous sprue may be due to excessive acid production by bacteria leading to incipient sprue, or to pro-sprue which in turn leads to anatomical sprue.

PASSICHA & LAL (p. 13) confirm older work by their finding that monilia is present in the stools of high proportions of healthy persons and of patients with intestinal diseases other than sprue.

RODRIGUEZ MOLINA (p. 14) records the results of blood examination in sprue. The changes vary so widely that nothing of value can be deduced other than what is already known.

AMALFIANO (p. 15) has performed the rhamnose test on a large number of patients with intestinal and other diseases. It was positive in two only one of whom had sprue and the other pernicious anaemia. He therefore regards it as of great value in the diagnosis of sprue. RODRIGUEZ OLLEROS and HERNÁNDEZ MORALES (p. 15) distinguish between sprue and pernicious anaemia by the fact that neutral red is eliminated more rapidly by the gastric mucosa in sprue. Details of the test and of the results obtained, are given.

HAYD (p. 16) has given an account of the diagnosis and treatment of sprue.

LE ROY and CHERIES (p. 16) give details of the progress and treatment of a case diagnosed as sprue with extreme pernicious anaemia. CAKOVA (p. 17) records two patients with symptoms suggesting tabes both were also diagnosed as suffering from sprue but SCOTT in comment points out that the information given is too scanty for such a diagnosis.

SALTVESEN and KOBRO (p. 17) discuss the aetiology of idiopathic steatorrhoea and suggest that the cause of the disease is to be found in the lymphatic apparatus between the intestinal walls and the larger collecting vessels. FANLEY points out in comment that in tropical sprue no evidence of lymphatic obstruction or of disease of the lymphatic glands has been found.

ROSE (p. 18) describes a case of idiopathic steatorrhoea in a child of 9 years who had never been to the tropics. HUGHES (p. 18) and HANSMAN (p. 18) have both contributed papers on steatorrhoea.

- i. MANSON BAHR (P) Glossitis and Vitamin-B₂ Complex in Pellagra Sprue and Allied States.—*Lancet* 1940 Sept 14 & 21 pp 317-320 356-360 With 8 coloured illustrations on 1 plate [68 refs.]
- ii. BENNETT (T Izod) & HARDWICK (C.) Chronic Jejunio-Ileal Insufficiency Pathogenesis of Coeliac Disease, Tropical Sprue, and Other Conditions.—*Ibid* Sept 28. Pp 381-384 With 3 figs [22 refs.]

i. It will be convenient to abstract these papers simultaneously as they deal with similar problems though the approach is made from different angles.

In the first attention is drawn to the state of the tongue and mouth in relation to the gastro-intestinal tract. The sore tongue of sprue is well recognized but a similar condition occurs in other closely related diseases. The known aetiological factors in this group of diseases include lack of nicotinic acid and riboflavin the former being concerned with glossitis and the latter probably as shown experimentally by Sebrell & Butler with *cheilosis* (angular stomatitis) which though usually observed in pellagra is seen in other allied diseases. Amongst other factors is the extrinsic factor which has a distribution and stability to heat resembling the PP factor (nicotinic acid).

The glossitis and stomatitis of fully-developed pellagra are characterized by angular stomatitis and changes in the epithelium of the lips as described by Stannus. Enright and others and recently illustrated by Spies & Cooper. It is acknowledged that it is this feature of the disease which yields most satisfactorily to nicotinic acid therapy. A similar glossitis and stomatitis in the absence of dermal titis has been regarded by Stannus and other authorities as an incomplete stage of this disease and has been termed pellagra frusta or larval pellagra. This was recognized by the reviewer in Ceylon in 1912. It is the same sore tongue disease which has been described so many times in this *Bulletin* that the impression is obtained that various observers in the tropics are describing the same appearances in the mouth and tongue of ill nourished people. It has even been suggested that direct sunlight may produce typical pellagrous dermal titis in these larval cases. It is claimed too that larval pellagra may be recognized in English practice in patients with glossitis, of which five examples are quoted all the patients had some gastro-intestinal disturbance and had been subsisting on a restricted dietary. All reacted satisfactorily to nicotinic acid therapy (150 mgm daily) but it must be remembered that all cases of stomatitis are not necessarily of this nature.

After a prolonged study of sprue glossitis over a period of thirty years, as well as from a series of 500 treated during the last two decades, the author expresses the view that there is no essential observable difference between the glossitis and stomatitis of sprue and those of fully developed or of larval pellagra. Angular stomatitis may even supervene in advanced cases of sprue as in pellagra. Oesophageal pain (dysphagia) is common to sprue pellagra and pernicious anaemia and occurs in about the same proportion of cases. Attention is drawn to certain peculiarities of sprue glossitis which were observed in 77 per cent. of the series. In no case was there severe anaemia when glossitis was acute this would suggest that the inciting cause of glossitis and of the megalocytic anaemia are not necessarily identical. As in pellagra so in sprue analytical study of a large series would seem to

indicate that previous intestinal or generalized infection, such as malaria predisposes to sprue. As in pernicious anaemia, the specific anti-anaemic factor is absent, and the blood responds effectively to the administration of the extrinsic factor (liver) but, in contradistinction to pernicious anaemia, in many cases of sprue the effects in restoring complete haemopoiesis are lasting.

A consecutive series of 20 European cases of tropical sprue with well marked glossitis was therefore treated (as in pellagra) with 150-300 mgm of nicotinic acid daily. It is claimed that the results were satisfactory and the effect upon the tongue was most striking. The glossitis subsided and the taste sense was restored in an average of three days but the effects upon the intestinal symptoms were more difficult to assess. This form of therapy did not seem to have any influence upon the megalocytic anaemia which was subsequently treated by parenteral injections of liver. It would appear to be necessary to continue treatment with nicotinic acid for at least three months. In cases with angular stomatitis riboflavin (3 mgm. daily) was given in addition. From a comparison with other methods of treatment of sprue glossitis over many years the comparatively recently introduced nicotinic acid treatment gave the most satisfactory results and the stay in hospital was short averaging 22½ days.

After recounting previous views on the hypothesis that the main symptoms and signs of tropical sprue can be attributed to deficiency evidence has been adduced that the defect lies in the small intestine. This defect, which is probably lack of absorption from the intestinal mucosa does not manifest itself as in pellagra and pernicious anaemia, in any ascertainable microscopical changes. But there are other gross lesions in the small intestine which reproduce a *simulacrum* of the clinical picture of sprue such as ulceration of the ileum tuberculous or malignant disease of the mesenteric glands, or gastro-jejuno-colic fistula. The conclusion seems inescapable that in disordered function of the small intestine notably the ileum lies the essential lesion of sprue. When, however the pathology of pernicious anaemia is contrasted with that of tropical sprue, it is found that the intrinsic factor is absent in both diseases, but whereas in the former this is directly associated with achlorhydria or achylia gastrica in sprue the clinical course of the disease continues the same whether there is achlorhydria achylia gastrica or even hyperchlorhydria (from figures compiled from a large series). But in tropical sprue complete clinical and haematological recovery frequently takes place even when the patient is in *extremis* and may persist, in the absence of further treatment and irrespective in some instances of the age of the patient. Pushing the analogy with pellagra still further it is claimed that a clinical condition designated larval sprue exists, in which the glossitis and stomatitis persist for months or even a year prior to supervention of the fully developed syndrome. In logical order the glossitis and stomatitis of pernicious anaemia, which are found in varying degrees in about the same proportion of cases, are on the whole similar to those of the sprue tongue further it is argued that the haematological changes in sprue are identical with those of pernicious anaemia and that differences in the blood picture are merely those of degree.

Pernicious anaemia arising in Europeans in the tropics appears to be rare five cases are quoted. All gave a prior history of intestinal disturbance and the fact elicited was that they occasionally suffered

from a sprue-like steatorrhoea. Though sprue and pernicious anaemia are undoubtedly closely related attention is drawn to the paucity of records of the latter in tropical natives. Indeed some authorities do not admit that the disease exists at all in the tropics. Subacute combined degeneration of the spinal cord in conjunction with pernicious anaemia is regarded by some observers as analogous to similar changes in pellagra and it has been claimed that these spinal lesions are never observed in sprue. It has however been met with on two occasions in this disease in this series and in each it was terminal and fatal. Details of these cases are given.

An analysis is also given of 8 European patients from the tropics with combined degeneration of the cord with glossitis. One of them had been treated with nicotinic acid (300 mgm daily) which appeared to cure the glossitis and to exert a favourable action on the spinal cord lesions. The main interest in these cases lies in the fact that on account of the glossitis and aphthous ulceration associated with preliminary and occasional fatty diarrhoea they had been regarded originally and subsequently treated as cases of sprue.

Idiopathic steatorrhoea is undoubtedly a condition quite distinct from sprue though some confusion has been caused by Thaysen who rather unfortunately introduced the term non-tropical sprue. As in tropical sprue glossitis is a conspicuous feature and is almost as frequent as in that disease and in three cases studied the appearances resembled those of tropical sprue very closely they also were amenable to nicotinic acid treatment though the effects of this combined with intense parenteral liver therapy were not by any means as striking as in sprue and in most the course of the disease was usually progressive in spite of treatment. Glossitis and stomatitis are found also in other forms of anaemia notably in nutritional megalocytic anaemia, *Diphyllobothrium* anaemia and in the Plummer Vinson syndrome — anaemia, dysphagia and malnutrition in underfed women.

In a group of diseases presenting so many different symptoms and due to so many different factors border line cases are encountered. Thus pellagrous dermatitis has been noted in sprue just as it has been seen in coeliac disease in children and in idiopathic steatorrhoea in adults. One such case is described with pellagrous rash on hands, face and genitalia, the patient having suffered from sprue for eighteen years. A remarkable recovery was effected by nicotinic acid therapy alone without addition of liver. Other cases of sprue may develop scurvy with scorbutic purpura of which two cases are quoted. Probably in the majority of sprue cases there is a relative C avitaminosis. Furthermore and rarely the clinical picture may embrace features of sprue, pellagra and idiopathic steatorrhoea so that it may be impossible to make an absolute diagnosis. An illustrative case is given.

In the present state of knowledge it is not possible to envisage the exact manner in which these various syndromes are related but it is clear that there exists some common connecting link or chain. Tentatively a table has been constructed suggesting the importance of absorption of the various factors and vitamins concerned in the production of the signs and symptoms of the diseases characterized by glossitis. It is difficult to believe that tropical sprue originates in the tropics alone and has such a peculiar distribution unless local conditions comprise some initial and decisive factor. The slow development of the disease is a further difficulty as it may develop many years

after the subject has left the indigenous area of the disease and in this respect a parallel may be drawn with idiopathic steatorrhoea which may first reveal itself in adult life as a sequel to coeliac disease in infancy though even here exceptions occur. It is concluded that glossitis of a similar nature is common to pellagra, sprue, idiopathic steatorrhoea, pernicious anaemia, and the nutritional anaemias and in each instance it is a sign of an avitaminous B_{12} and that, through this feature, the aetiology of these diseases may eventually be rendered more clear (a coloured Plate with eight figures illustrates these various forms of glossitis).

ii. In the second paper Izod Bennett and Hardwick discuss the pathogenesis of coeliac disease, tropical sprue and other conditions and the probability that several clinical features are due to chronic jejuno-ileal sufficiency. Protected above and below by the pylorus and the ileocaecal sphincter the jejunum and ileum are shut off from many adverse influences which cause disease in more exposed parts of the body. Consequently chronic ulceration and malignant disease are rare below the duodenum. No one appears to have described what happens when there is partial or total failure of the jejunum and ileum to fulfil their normal functions. The clinical syndrome thus produced is a combination of steatorrhoea, tetany and macrocytic anaemia. Within this definition fall coeliac disease (idiopathic steatorrhoea) and tropical sprue. The tendency as in Germany and Scandinavia, to group these latter two together is deprecated. But this syndrome is also found in some cases of malignant or cicatrizing diseases of the small intestine, of gastro-colic fistula and of tabes mesenterica. Rickets and deformed bones are common when the syndrome occurs in children. The anaemia at times is hypochromic, or erythroblastic stomatitis and sore tongue are common and pellagrous skin lesions may be noted. The fatty diarrhoea is notable, for the fat is fully split. Megacolon, which is perhaps compensatory may be pronounced but when the syndrome commences in childhood and proceeds during adolescence there is stunting of growth accompanied by infantilism, and, in adult life sterility. In pregnancy there is often an acute exacerbation of symptoms. Biochemical changes are a sequel. Blood calcium and blood phosphorus are low and usually the glucose-tolerance curve is flattened. Achlorhydria is common, but by no means constant.

Coeliac disease and tropical sprue are therefore two relatively common diseases distinct from one another. The main points are that coeliac disease is a disease of children tropical sprue of adult life. Megacolon is common in older patients in the former rare or hardly known in the latter. Rickets and deformed bones are found in coeliac disease alone. The blood pictures of the two diseases sometimes differ and, whilst established coeliac disease is fatal in 40 per cent., tropical sprue has an extremely good prognosis under modern conditions. Delayed coeliac disease and delayed sprue have several features and analogies in common. In 15 cases of adult coeliac disease (idiopathic steatorrhoea) in one only did the history commence later than childhood. The exceptions to this are rare one, a female, is quoted the disease commenced at 14 and death was eventually due to fulminating pernicious anaemia. Two cases of delayed onset in tropical sprue are quoted—one a female, of nine years, with tetany and anaemia in which the results of treatment were most satisfactory a second, a man of 53 with a latent period of four years, who responded favourably to nicotinic acid and riboflavin therapy. A third example is quoted where

typical sprue developed thirty-seven years after the patient had left the tropics. One case is recorded in which steatorrhoea commenced suddenly in adult life in a woman of 42 in general features and the absence of osteoporosis the condition resembled tropical sprue. Tetany was a marked feature with positive Trousseau's and Chvostek's signs. The patient had been under treatment for tetany with calcium gluconate campolon etc. without relief but on the administration of 150 mgm. nicotinic acid daily remarkable improvement took place. The tetany vanished and the glossitis abated but two months after discharge the disease returned with grave emaciation and continuous tetany with low blood calcium (8 mgm per cent.) and the result was fatal. A second similar case in a woman of 34 is quoted and the authors express the opinion that they may be accepted as examples of a syndrome indistinguishable from *tropical sprue* manifesting itself in a non-tropical country.

The nature of the syndrome (jejuno-ileal insufficiency) is defective absorption from the small intestine and there is something more extensive than mere inability to absorb fat and fat-soluble substances. The clinical picture is one of chronic jejuno-ileal insufficiency so that in sprue and coeliac disease we see the effects of gross interference with the total function of the small intestine. The result is carbohydrate dyspepsia with gaseous distension of the bowel. The fat though split cannot be digested and produces steatorrhoea. The sugar is poorly absorbed resulting in the flat glucose curve with the result that blood urea and serum protein are often low also. Poor absorption of salts results in tetany and defective ossification defective absorption of iron is followed by hypochromic and megalocytic anaemia owing to failure to absorb the anti-pernicious anaemia factors. Toadskin and xerophthalmia proclaim deficient vitamin A sore tongue oedema, angular stomatitis defective growth and pellagra result from deficiency in vitamin B complex rickets infantilism and sterility from deficiency of vitamins D & E. Sudden haemorrhage in some cases denotes a similar defect of vitamins K or P.

The ultimate proof of the nature of the syndrome lies in the evidence provided by gastrocolic fistula—in this condition diarrhoea and loss of weight are severe with macrocytic anaemia, sore tongue and hypocalcaemia. The resemblance to tropical sprue or idiopathic steatorrhoea is striking. A gastro-colic fistula creates a complete general disturbance and in most cases there is a short-circuit uniting stomach, small and large intestines. Such a case is described in a man of 46 who developed the sprue syndrome complete with glossitis which reacted instantaneously to nicotinic acid therapy. The steatorrhoea (56 per cent total fat) macrocytic anaemia and tetany were present also. Following a laparotomy which restored the normal continuity to the bowel complete recovery ensued. It was found that the fistula had been due to leakage from a duodenal ulcer. It is therefore concluded that the same syndrome in its major aspects is present in all these conditions though usually it is possible to identify the disease responsible for each case.

[Views somewhat similar to those of the reviewer on the aetiology of sprue have been expressed by NICHOLLS, this *Bulletin* 1936 Vol. 33 p 65]

P H Manson Bakr

VEDDER (Edward B.) A Discussion of the Etiology of Sprue.—
Amer J Trop Med 1940 May Vol. 20 No. 3 pp 345-357
 [38 refs.]

This is an exceptionally clear exposition of a difficult subject. Professor Vedder refers briefly to some of the older and now discarded views on the causation of sprue calls attention to the chief symptoms and their probable pathogenesis, and finally presents yet another theory—patulatory dysfunction—on grounds which, as the author frankly admits, are purely theoretical.

Since the symptoms of sprue may lie latent for many years after a man has ceased to live in the tropics what essential differences are there he asks, between tropical and non tropical sprue? Points on which the dualists are accustomed to rely are disposed of by saying that cases of non-tropical sprue are not recognized early last longer and in consequence, the symptoms may be more pronounced. The sequence of symptoms is then given on lines reminiscent of the "house that Jack built" or the dangers of procrastination in "for want of a nail the shoe was lost" and this mode of presentation is really very instructive. The stages are as follows. Primarily a functional disturbance of the small intestine, as a result of which there is impairment of absorption of food impairment of food absorption entails reduction of fat absorption and this means steatorrhoea. owing to the steatorrhoea diarrhoea develops impairment of absorption means less glucose absorbed and from this intestinal fermentation, gaseous distension and frothy stools. Owing to the diarrhoea there is reduced absorption of calcium and of iron and the result of the latter is hypochromic anaemia. Deficient absorption of vitamins aggravates the intestinal symptoms and the vicious circle is complete.

Speaking of the last in a little more detail. Deficiency of vitamin A impairs gastric and intestinal glandular activity and leads to failure to produce sufficient antianæmic principle. deficiency of vitamin B₁ diminishes appetite and reduces motility of the digestive tract [but sufferers from sprue complain of undue and inconvenient motility] there may be some deficiency of vitamin B₂, e.g. the riboflavin constituent which may explain certain affinities between pellagra and sprue. vitamin D deficiency evidenced, for example, by osteoporosis, is rare in tropical sprue [many maintain that osteoporosis never occurs in tropical sprue and is an important point of distinction from the non-tropical] because the tropical sunshine supplies it adequately. vitamin K is said to be deficient and this is evidenced by prothrombin deficiency and prolonged coagulation time.

The author concludes that sprue appears to be associated with hormonal inadequacy—parathyroid, thyroid, adrenal—and that the anterior pituitary exercises control of various hormones, including these and it may control intestinal function and he adds

"Let us assume that a functional failure in some degree of the anterior pituitary secretion is responsible for the failure of the function of absorption of the intestine, and that this pituitary hypofunction is precipitated in some individuals by tropical service."

[This article is not only instructive but entertaining unfortunately the theory rests on this. Let us assume and, as stated earlier for this the author himself says no proof has been afforded. If proof

can be adduced all tropical workers will be grateful to see the solution of this vexed problem— if disproved it looks as if this house will fall as did its predecessors.]

H H S

POCK STEEN (P H) Die Differentialdiagnose der sprueartigen Erkrankungen [Differential Diagnosis of Sprue-like Diseases].—*Schweiz Med Woch* 1940 May 4 Vol. 70 No 18 pp 385-392. [60 refs]

[This is an abstruse or at least abstrusely worded article and after repeated readings the abstracter doubts whether he has really grasped the thesis put forward. But so far as he does understand it the case is as follows.] It would appear that there are two main factors concerned in the production of sprue: 1. Histamine intoxication. 2. Loss of vitamin B₂. On this basis the author has built up a complicated table or series of tables, to demonstrate the connexion between sprue and sprue-like diseases which he designates as *incipient sprue* which may go on to *prosprue* on the one side and *pseudosprue* on the other. Either of these may pass over to *anatomical sprue* the last being no longer affected by antiparasitic treatment whereas pseudosprue may be.

A second table deals with *metabolic sprue*. Here again a twofold action is at work. From climatic causes there is produced an adrenal insufficiency and from it there result on the one hand a histamine toxicosis and on the other activation of phosphorylizing ferments, and the latter by interfering with resorption of vitamins, fats and glucose leads to deficiency of vitamin B₂ and to *prosprue* and the histamine toxicosis to *incipient sprue* the so-called reversible *prosprue* passes on to irreversible *anatomical sprue*.

A third table gives the author's view of the sequence in *enterogenous sprue*. Here also is a twofold action. Excessive acid production in the colon by bacterial action and inhibition of defensive ferment activity by histamine and by parasitic action. Resorption of the acid products (H Stoff) leads to central and peripheral irritation (or stimulation) the former giving rise to *incipient sprue* and the latter to a mixture of cutaneous (eczema, urticaria) rhinopulmonary (paroxysmal sneezing, rhinitis, asthma) and intestinal symptoms. Toxic inhibition of ferments as in metabolic sprue malabsorption of vitamins, fats and glucose leading to *pseudosprue* and then to *anatomical sprue*. *Prosprue* the author speaks of as reversible *pseudosprue* and *anatomical* [? tropical] *sprue* as irreversible. [It all seems very hypothetical and to have no very intimate relation with the title of the article.]

H H S

PARRICHA (C L.) & LAL (S) The Incidence of Monilia in Human Faeces.—*Indian Med Gaz* 1939 Nov Vol 74 No 11 pp 682-683

Ashford's theory that a monilia is the cause of sprue seems to be as hard to kill by argument as the fungus itself. Eleven years after the theory was suggested and in spite of much accumulated evidence against its acceptance MACKIE and CHITRE by experimental work [see this *Bulletin* 1929 Vol 26 pp 498-9] and by clinical investigations [idem 1930 Vol 27 p 349] would be thought to have laid the spectre by recording the results of examination of 71 patients with sprue and

78 non sprue patients. They found monillas as frequently in one group as in the other. The authors have thought it might be useful to re-open the question by examining a number of Indians and Europeans, either healthy or suffering from diseases other than sprue to determine whether they were passing monilla in their stools and, if so in what proportion. Of 148 [144] Indians on Indian diet, 108 or 73 per cent. were passing monilla which was isolated of 78 Europeans on European diet 34 or 51.3 per cent. Of 60 suffering from intestinal disease (but not sprue) 45 or 75 per cent. were passing monilla, as were 99 out of 180 apparently healthy subjects (82 per cent.)—together in 144 out of 220 (85 per cent.) (There is a little discrepancy in one section of the protocol, in which the total examined amounts to 222, not 220 and the total positive to 145 not 144 but this does not vitiate the finding that monilla is found almost equally prevalent in the stools of healthy and diseased individuals in the tropics and that there is no justification for regarding it as of aetiological importance in sprue.)

H H S

RODRIGUEZ MOLINA (R.) *Hematology of Sprue. Report on 100 Cases in Puerto Rico.*—*Puerto Rico J. Public Health & Trop. Med.* 1939 Sept. Vol. 15 No. 1 pp. 89-100. [21 refs.] [Spanish version pp. 101-110]

[Study of the peripheral blood in cases of sprue still goes on in spite of the fact that no more serviceable end seems to be attained than a fruitless ploughing of the sand.] The author records the results of detailed examination of the blood in a hundred cases of sprue before treatment. Fifty-seven were males, 43 were females, and their ages ranged between 12 and 78 years. Briefly stated, erythrocytes varied between 0.84 and 4.47 millions per cmm. haemoglobin between 3.7 and 16.0 gm. The chief, perhaps only fact of value in this respect is that 80 per cent. of patients showed anaemia of the macrocytic type—confirmation of what has been known for years. The mean corpuscular haemoglobin ranged between 19 and 61 micro-micrograms, the volume of packed cells between 9.8 and 47.9 cc. per cent. When the red cell count fell below two millions erythroblasts were more numerous. Leucocyte counts varied between 850 and 9,800 per cmm. In nearly half the cases (43.8 per cent.) the count was within normal limits. Reticulocytes ranged between 0 and 12 per cent. and platelets between 40,000 and 290,000.

The anaemia of sprue has been spoken of as "aplastic," but the author's evidence is much against this view. It is true that the cellular elements are decreased, but the presence of reticulocytes, of erythroblasts and polychromatism is the rule rather than the exception and the bone-marrow findings tend more to the hyperblastic type. [As already stated examination of the peripheral blood in sprue reveals changes within such widely separated limits that nothing of value can be deduced. A comparison of the conditions present before treatment and at various stages after treatment is begun might be more profitable.]

H H S

RODRIGUEZ MOLINA (R.) *Sprue in the Puerto Rican Indigent.*—*Bol. Asoc. Med. de Puerto Rico* 1940 June. Vol. 32. No. 6. pp. 187-195

AMALFITANO (Gabriele) Sul significato e il valore diagnostico della prova del ramosio di Castellani [The Diagnostic Value of Castellani's Rhamnose Test.]—*Policlinico Sez. Prat* 1939 Nov 20 Vol. 46 No 47 pp 1999-2002

The rhamnose test is intended as a gauge of absorption of mono-saccharide sugars from the intestine and if it fails to appear in the urine this has been held to be diagnostic of sprue. [See this *Bulletin* 1938 Vol 35 p 53] The author reports that he has carried out the test on some hundred cases which included patients suffering from infective diseases respiratory cardiovascular and renal affections hepatic and blood diseases intestinal conditions including gastric and duodenal ulcer gastro-enteritis amoebic and bacillary dysentery mucous membranous and ulcerative colitis, intestinal tuberculosis helminthic infestations and one case of sprue. Among these the result was negative in two only the sprue patient and one with anaemia of pernicious type. The author therefore regards the test as of great diagnostic (and even of prognostic) value. As stated before the value would be even greater for prognosis if the test could be made quantitative
H H S

RODRIGUEZ OLLEROS (A.) & HERNÁNDEZ MORALES (F) El estómago en el síndrome esprú tropical (Cromoscopia.) [The Gastric Function in Tropical Sprue.]—*Puerto Rico J. Public Health & Trop Med* 1940 Mar Vol. 15 No 3 pp 274-282. [16 refs]

The authors investigated the elimination of a dye—neutral red—by the gastric mucosa in cases of sprue and other diseases and find this is more rapid in sprue patients than in those with the same degree of hydrochloric acid secretion but suffering from disease other than sprue. By this test which is designated gastric chromoscopy sprue and pernicious anaemia may be differentiated. The procedure is as follows After a 12-hour fast the patient is given 0.2 gm of caffeine in 300 cc. water coloured with two drops of a solution of methylene blue to stimulate gastric secretion. The result is analysed and after the stomach has been emptied 5 cc. of 1 per cent neutral red are injected into the gluteal region. If the gastric contents are found to contain no free HCl histamine is injected subcutaneously at the same time. Thereafter the gastric contents are withdrawn every five minutes till the red colouration is seen and the interval between the injection and the appearance of the dye in the stomach is noted.

In a table are given the findings in 27 cases of sprue in one where the diagnosis rested between sprue and pernicious anaemia and in one case of pellagra. In twenty-one sprue patients no histamine was needed. Five had normal gastric secretion and the time for elimination of the dye was in one case 15 minutes in all the others 10 minutes. Twelve had hypo-acidity and the time varied from 5 to 40 minutes three had hyperacidity and the times were 10 minutes in one 15 minutes in two. In six receiving histamine the time ranged between 10 minutes (2 patients) and 35 minutes (2) the others being 15 and 30 minutes. The pellagrins and the doubtful patient had anacidity and histamine was given but no neutral red appeared. The diagnosis in the latter was consequently pernicious anaemia.
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H H S

HARD (Robert F) The Diagnosis and Treatment of Sprue.—*Glasgow Med. J.* 1939 Dec. Vol. 132. No. 6. pp. 209-217

This is a satisfactory statement of the main facts known regarding sprue and its present-day treatment, and will be of much service in directing the attention of the general practitioner to the existence of such cases in the British Isles, for symptoms may not appear until the patient has returned from the tropics and even for some years after and failure to recognize the condition means delay in proper treatment and needless prolongation of suffering and perhaps death.

H H S

LE ROY & CHERTIN Un cas de sprue tropicale avec anémie extrême para-blermérienne Guérison [A Case of Tropical Sprue with Extreme Pernicious Anaemia. Cure.]—*Bull. Soc. Path. Exot.* 1940 Mar 13 Vol. 33 No. 3 pp. 181-188

[Reading the detailed records of this case the reviewer is led to doubt strongly the diagnosis, either of the sprue or the pernicious anaemia.] The authors divide the course of the disease in this patient into three stages: 1 That of endocrine disturbance. 2 That of intense pernicious anaemia. 3 Convalescence and recovery. The facts to be placed before readers are as follows:—

A soldier 31 years of age was in hospital at Hanoi on account of dysentery. He was repatriated to France and improvement was marked: stools 1-2 daily became normal and he gained 4 kgm. in weight. Some 4-5 months after arriving in France he was again admitted to hospital with abdominal pain vomiting diarrhoea (5-6 stools daily greenish-yellow like cow-dung). The liver was enlarged and painful and there was albuminuria. The blood examinations are detailed, they were made almost weekly from October to February and the very abrupt changes are peculiar. Thus, successive findings were: r.b.c. 4,740,000 Hb. 90 per cent. C.I. 0.9 a month later red cells 1,980,000 Hb. 75 per cent. C.I. 1.0 then at weekly intervals, 800,000 60 per cent. C.I. 3.9 [!], 895,500 40 per cent. 2.5 1,270,000 45 per cent., 1.8 1,570,000 45 per cent. 1.5 2,290,000 80 per cent. 1.8 3,080,000 90 per cent., 1.5 3,280,000 90 per cent., 1.4 4,280,000 90 per cent. 1.0 4,520,000 90 per cent. 1.0 5,440,000 95 per cent., 0.9. In the same time the leucocytes were also very variable in total, ranging between 1,100 and 7,400 per cmm. with a high percentage of lymphocytes, up to 56. Very rarely were any erythroblasts seen and no anisocytosis.

Treatment comprised absolute rest in bed, diet of meat juice olives liver nearly raw and lemon and orange juice and vegetable soups (milk was badly tolerated). Medicinally calcium chloride by mouth, hydrochloric acid, adrenalin subcutaneously cachets of pancreas, of gastric mucosa and extracts of spleen. The diagnosis of sprue is based on the presence of Monilia, on steatorrhoea, greyish aspect of face and the hypochlorhydria. Blood calcium was diminished. [On the other hand, the presence of Monilia has no diagnostic significance, no analysis of the stools is recorded, the liver was enlarged the stools were greenish-yellow the corpuscle reduction was marked but the haemoglobin remained abnormally high.]

H H S

CANOVA (F) Alterazioni nervose nella sprue [Nervous Disturbances in Sprue.]—*Riforma Med* 1939 Nov 18 Vol 55 No 46 pp 1637-8 1641 [12 refs.]

The two cases recorded are of interest in that both patients presented symptoms suggestive of tabes—unequal pupils, Rombergism, loss of patellar reflex—or of polyneuritis—pain along nerve trunks steppage gait loss of deep reflexes—but the Kahn reaction was negative to repeated tests with serum and cerebrospinal fluid and gastric and other crises were absent and the diet was fairly varied. Other symptoms are said to have been characteristic of sprue and in the case of the second a man of 30 years the stools were fatty and frothy and there was stomatitis nothing is said in regard to this in the first patient [In the absence of more detail and of laboratory investigations the diagnosis seems to have a somewhat exiguous foundation.]

H H S

NAPIER (L. Everard) Tropical Sprue A Résumé of a Lecture.—*Indian Med Gaz* 1939 Nov Vol 74 No 11 pp 688-692

HUGHES (William) Sprue and the Steatorrhoeas.—*Jl Trop Med & Hyg* 1940 Apr 15 & May 1 Vol. 43 Nos 8 & 9 pp 105-110 122-128 [57 refs.]

SALVENSEN (Harald A) & KOBRO (Mikael) Symptomatic Sprue.—*Acta Med Scandinavica* 1939 Vol. 102. No 4-5 pp 277-294 With 4 figs on 2 plates. [24 refs.]

In this paper five cases of symptomatic sprue are reported in all of whom steatorrhoea was an outstanding feature all the other sprue symptoms were regarded as secondary to malabsorption of fat Two cases were examples of isolated granulomatosis of the small intestine and the mesenteric lymphatic glands. The third was one of tabes mesenterica in an adult with extensive tuberculosis of the entire mesentery and destruction of the glandular apparatus. The fourth case was one of gastrocolic fistula in the fifth there were two strictures of the small intestine attributed to X ray treatment for menorrhagia eighteen years previously

The authors discuss the bearing of clinical biochemical and pathological data collected in these cases on the aetiology of so-called idiopathic steatorrhoea and suggest that the cause of the disease is to be found in the lymphatic apparatus of the mesentery somewhere along the route from the intestinal wall to the larger collecting vessels [In tropical sprue FAIRLEY and MACKIE investigated this possibility fourteen years ago and failed at post-mortem to find any evidence of lymphatic obstruction or disease of the lymphatic glands.] In support of this contention the authors cite a number of cases in the literature in which lymph stasis has been observed at autopsy in non tropical sprue and conclude that sprue anyway the non tropical form, cannot be regarded as a disease *vis generis* [See also this *Bulletin* 1930 Vol. 27 p 1024 1932 Vol. 29 p 463 1936 Vol. 33 p 69]

N Hamilton Fairley

ROX (O) Et tilfelle av sprue. [A Case of [Non-Tropical] Sprue].—
Nordisk Med 1939 Nov 11 Vol. 4 No. 45. pp. 3336-3338.
 English summary

The case here described is entitled "sprue, though the patient, a girl of 9 years, had not been abroad. In its symptoms the case showed more resemblance to true sprue than the majority of cases of idiopathic steatorrhoea. The number and character of the stools, the ratio of neutral fats to fatty acids, the reduction in serum-calcium, the phosphorus content all were such as occur in sprue. On the other hand, the absence of stomatitis, the great changes in the blood, the early relapse after treatment are more characteristic of idiopathic steatorrhoea. Osteoporosis, commonly seen in the latter not in the former is not mentioned nor is any measurement of the corpuscles. The blood changes were very marked. When first examined red corpuscles numbered 1 010 000 per cmm. and haemoglobin 20 per cent., colour index 1 two months later 6,260 000 and 75 per cent., C.I. 0.6 after another four months, 3,570 000 and 52 per cent., C.I. 0.7 and a fortnight later 2,630,000 and 35 per cent., C.I. 0.7 no erythroblasts were noted. The patient received ten injections of lactoflavine, each of 1 mgm. and eight of campolon, each of 5 cc. but without effect.

H H S

HUGHES (Laurence) *Steatorrhoea*.—*Med J. Australia*. 1939
 Nov. 4. 26th Year Vol. 2 No. 19 pp. 671-678. With 8
 graphs [23 refs.]

HANSMAN (F S.) *Steatorrhoea*.—*Ibid* pp. 677-680. With 2 figs.

Neither of these papers contributes anything fresh on the subject of sprue they were not intended to deal with tropical sprue. They were papers read and discussed at a meeting of the New South Wales Branch of the British Medical Association. Dr Hughes deals with steatorrhoea as a symptom of coeliac disease of children. Dr Hansman with the physiology of fat ingestion digestion, absorption and excretion. None of the speakers had had much experience of tropical sprue but the general consensus seemed to be that it is a condition distinct from coeliac disease idiopathic steatorrhoea and what has been repeatedly spoken of as "non-tropical sprue." The majority of those who are acquainted with these various conditions will agree with them.

H H S

LEPROSY

PRECIS OF ABSTRACTS IN THIS SECTION

ROGERS *et al* (p. 20) show that 87 lepers have been seen in the British Isles during the last few decades. More than half of these are dead or have been repatriated and of the 40 remaining 22 have disease of the lepromatous type. The position with regard to the possibility of spread is satisfactory but the authors advise isolation in the St. Giles Home for those who cannot carry out home isolation.

LOWE and SANTRA (p 21) found an incidence of 7.4 per cent in an area of N Bengal, but only 4.1 per cent of the cases were of infective lepromatous type. The incidence in children was relatively low. DAVEY (p 21) shows that in Nigeria leprosy surveys are followed up by the foundation of clinics and villages for segregation which are visited regularly by the headquarters staff. In the surveys an incidence of 3.3 per cent was found. Details of organization are given and it is thought that the system will help to control the disease.

From a study of leprosy in N America AYCOCK (p 21) concludes that hereditary susceptibility is a major factor in the propagation of the disease rather than family contact.

BADGER *et al* (p 22) have studied four strains of acid fast bacilli cultivated from leprosy patients but have not found evidence that they were concerned in the aetiology of the disease.

COLLIER (p 22) in a preliminary report shows that monkeys fed on Colocasia and inoculated with human leprosy material showed lesions at a time when no lesion was apparent in control animals. OBERDOERFFER and GEHR (p 22) discuss the world incidence of foods containing sapotoxin in relation to leprosy.

LAMBORN (p 22) has found leprosy bacilli in the faeces of *Periplaneta orientalis* for as long as 66 days after feeding on dressings from leprosy sores. In control cockroaches saprophytic acid fast bacteria only were found.

COWDRY (p 23) discusses the globi of leprosy bacilli seen in skin lesions and in giant cells which probably take origin from components of the reticulo-endothelial system.

COUSIN *et al* (p 23) discuss the hyperpolypeptidaemia often found in leprosy.

PESCE (p 24) has devised a method of expressing the different forms of leprosy by means of a single numerical symbol.

CHALA *et al* (p 24) report the results of sternal puncture in leprosy. BERNY and MAUZÉ (p 24) describe a new diagnostic skin test in which the antigen is prepared from the urine of bacteriologically positive cases of leprosy. It is claimed to be positive in 100 per cent. of lepers, but negative in controls. NOLASCO (p 25) found that only 4 of 48 lepromatous patients were positive when tested with lepromin while they were in various states of the lepra reaction. He concludes that this does not support the view that the lepra reaction is a manifestation of allergy. ERMAKOVA (p 25) however regards the reactive stage of leprosy fever as an allergic state and describes the condition found.

COLLIER and MCKEAN (p 26) have obtained shrinkage or softening of nodules by treatment with diphtheria antitoxin in about 50 cases. The acid fast bacilli became granular or broken up. No such results were obtained in controls treated with tetanus antitoxin or antivenene. Similar results were obtained with diphtheria toxoid, but with nerve cases the effects were less evident though some improvement was found. The treatment appears to be very promising.

COCHRANE *et al* (p 27) report that the substitution of a wheat diet in place of rice has considerable effect in relieving the neuritic and bone pains of leprosy but does not hasten the improvement in the lepromatous condition. GWINDER (p 27) reports unsatisfactory results from the use of Solganal B in treatment of generalized leprosy. DE (p. 27) finds that creosote acts as an anti-oxidant when used as a preservative in hydnocarpus oil.

In the *International Journal of Leprosy* (p. 27) are given the opinions of a number of workers on the subject of the regulations which should govern travel by persons with leprosy especially of non-infective type. The opinions cannot be further abstracted but it may be noted that there is little unanimity and the matter needs to be regulated.

BUKKER (p. 28) reports on 9 leper colonies in Upper Burma. SITANALA (p. 28) discusses the leprosaria of the Netherlands Indies.

Rat Leprosy KRAKOWER and GONZÁLEZ (p. 28) find great similarity between the bacilli of mouse and rat leprosy but BADGER and FITZ (p. 29) find variation in virulence in different strains of rat leprosy bacilli isolated from wild rats.

FITZ (p. 29) shows that when rat leprosy bacilli are injected they are ingested by polymorphonuclear leucocytes and that giant cells are formed by fusion of histiocytes in recent foci.

RIBEIRO (p. 29) found that one fraction of certain vegetable carotinoids has some effect in changing the distribution of the bacilli when used for treatment of rat leprosy.

BADGER *et al* (p. 29) have found that in rats deficiency of vitamin B₁ leads to increased susceptibility to rat leprosy. Deficiency in calcium leads to inability to utilize the vitamin B₁ available in the diet.

C IV

ROGERS (Leonard) COOK (J. Howard) & MUIR (E.) *Leprosy Cases in the British Isles.*—*Brit Med. J.* 1940 July 6. pp. 7-8. Also in *Leprosy Review* 1940, Oct. Vol. 11 No. 4. pp. 170-173

This report of a committee of the British Empire Leprosy Relief Association deals with the data regarding the number of cases of leprosy seen in the British Isles during the last three or four decades by the leading dermatologists, who filled in forms sent to them for the purpose. The number had frequently been guessed to be about 100 but the probably not quite complete data tabulated show 87 of whom 23 at the time of the enquiry were known to be dead, 13 had been repatriated, and 11 not seen for over ten years are presumed to be dead or repatriated. This leaves 40 cases for further consideration, including 8 last seen within ten years regarding whom no recent information is available, but who are presumed to be still alive and in this country. Of these 40 17 are slightly infective neural cases and one a mildly infectious tuberculous case. The remaining 22 belong to the more dangerous lepromatous type but 5 of these are isolated at the St. Giles Home. Two are isolated with careful precautions at their homes 2 have passed into a quiescent little infective condition under expert treatment, 4 were reported from the Tropical Diseases Hospital, so will have been instructed in the necessary precautions, and 5 more are under expert treatment and advice. In the remaining four the conditions of living were reported to be unsatisfactory at the time they were last seen some years ago.

The Committee conclude that the present position is reassuring in view of the fact that nearly all the infective cases are under expert care and many of them have reached an age when they are unlikely to come into close contact with susceptible children. They however advise that the few infective patients, who are not in a position to

carry out effective home isolation with prohibition of close contact with children should, as far as possible be accommodated at the St Giles Home

L Rogers

LOWE (John) & SANTRA (Isaac) An Epidemiological Study of Leprosy with Special Reference to the Leprosy Survey in Santalpur (North Bengal).—*Leprosy in India* 1940 Apr Vol 12. No 2. pp 43-54 [13 refs.]

The authors report on a survey of 3 600 Santals in North Bengal. They found the high incidence of 7.4 per cent. but the proportion of infective lepromatous cases was only 4.1 per cent. of the total cases with a relatively low incidence among children and a high incidence in adults and old people. They therefore conclude that in spite of the high incidence of leprosy the disease does not constitute an important health problem in this area.

L R

DAVEY (T F) First Report on Leprosy Control Work in the Owerri Province, S Nigeria.—*Leprosy Review* 1940 July Vol 11 No 3 pp 123-134 With 1 map

This is a further report on the successful prophylactic measures in use in South Nigeria in a large tract of country surrounding the Uzuakoli Leper Colony. Surveys are followed up in the Owerri Province 150 miles in length by 60 in width by the foundation of clinics and villages for segregation of the more infective cases within reach of treatment which are visited and treated once a week by the headquarters staff. During 1939 11 689 people were examined and 401 cases 33 per mille found. Land was given by the chiefs and the necessary simple buildings constructed by the patients themselves at no cost to the colony. At the end of 1939 1 243 cases were being treated and the numbers were increasing rapidly. A leper nurse was provided for each clinic. These clinics are built near motor roads and the patients are found to attend regularly and obvious improvement is seen in many of them. In one centre every infectious case is now isolated in the leper village the houses of which are superior to those in the surrounding villages so that lessons in sanitation are being provided for the people. Leprosy inspectors are being trained and courses given to both teachers in the schools and to sanitary inspectors and medical officers are also being trained. Thus the influence of the Leper Colony is being extended to extensive surrounding areas at a very low cost and must in time materially help in controlling leprosy in the whole province.

L R

AYCOCK (W Lloyd) Familial Susceptibility as a Factor in the Propagation of Leprosy in North America.—*Internat J Leprosy* Manila. 1940 Apr-June Vol 8 No 2. pp 137-150 With 3 figs. [11 refs.]

This paper deals at some length with the well known histories of the introduction and spread of leprosy in French families in New Brunswick from 1815 in Louisiana from 1768 and among Scandinavians in Minnesota in the second half of the nineteenth century. Contrary to the general opinion that family contagion best explains the facts the author concludes that the data of these outbreaks of leprosy in several

PESCE (Hugo) Un símbolo individual combinado y un índice colectivo para expresar la evolución de la lepra. [A Single Symbol to express Leprotic Conditions].—*Bolet. Oficina Sanitaria Panamericana* 1940. June. Vol. 19 No. 6. pp. 562-568.

By means of what the author calls a "collective index" he suggests a method of expressing the evolution of a case of leprosy. Since it is put forward by the Chief of the Anti-Leprosy Campaign in a district of Peru, it is thought that some notice should be taken of it, but, unless the reviewer has misconstrued the idea, its value would seem to be less than nil, for it would tend to mislead. He, so it appears, assigns a number 1 2 or 3 to the stage of a cutaneous (lepromatous) or a nerve case, or in a mixed case adds the two and states the total. For example $L2=2, N2=2$ $L2 \vee 1=3$ $L1 \vee 2=3$ 4 might therefore be a patient in the third stage of the cutaneous and the first of neural or the second of each, or the first of cutaneous and late, 3rd stage neural. [What help that would afford to a compiler of statistics is beyond the power of the reviewer to assess.] H H S

CHALA (J. Ignacio) BRUMPT (Lucien Ch.) & LLERAS RESTREPO (Federico) Punción de la medula ósea en la lepra. [Sternal Puncture in Leprosy].—*Rev. Colombiana de Leprología*. Bogotá. 1940. Feb. Vol. 1 No. 4 pp. 246-256. With 6 figs.

The value of this article is a little difficult to gauge. The authors state in their conclusions that they regard sternal puncture as a new method for diagnosis of leprosy and especially useful for finding Hansen's bacillus in cases where examination of the nasal mucus and gland juice has failed. They go on to say that they carried out sternal puncture in 15 leprosy cases and found the bacillus "eight times out of fourteen with lepromata and twice in the nervous form." There are no quantitative modifications of the myelogram but "foamy cells of Virchow" are present in those cases which show the bacillus.

[So much for the conclusions stated reference to the letterpress does not bear this out. A table of the 15 cases is given. 8 of them are mixed forms, 5 nodular and 2 the nervous type. In four only is the bacillus stated as present in the marrow and in one only of the nervous type where the gland juice was negative. The gland juice was positive in 12 out of the 14 in the remaining two there is no mention of the findings whether positive or negative.] H H S

BERRY (P.) & MAUZÉ (J.) Une nouvelle méthode de diagnostic de la lèpre par intradermo-réaction. (Note préliminaire.) [A New Diagnostic Intradermal Reaction].—*Bull. Soc. Path. Exot.* 1940. Apr. 10 Vol. 33. No. 4. pp. 239-243.

The authors describe yet another intradermal reaction which they consider to be of diagnostic value. The antigen was prepared by the method of Max-Aron from the urines which were free from albumin, of eight bacteriologically positive cases of leprosy. To a quantity of the mixed fresh urines three times the volume of 95 per cent. alcohol was added to form a precipitate from which the fluid was decanted after 24 hours the precipitate was centrifuged and dried in a vacuum. To 100 cc. of filtrate of a 3 per cent. solution of the dry extract in physiological saline 10 drops of ammonia were added, and after further filtration the fluid was adjusted to a pH between 6.4 and 6.6 with acetic acid and preserved in ampoules in an ice box. For use 2 to

3 drops of the extract are injected into the skin of an arm and two drops of distilled water as a control in the other arm.

Tests have been carried out in 189 lepers of all stages in 5 suspects and in 91 healthy subjects and observations made after 8 24 and 48 hours. In leprosy cases there is a rise of temperature to 38°C or 39°C in eight hours and after 24 hours a papule exceeding 1 cm in diameter appears usually accompanied by erythema and pain. Such reactions are reported to have been obtained in 100 per cent. of lepers but in none of the controls

NOLASCO (J O) The Lepromin Test in Lepra Reaction.—*Internat J Leprosy* Manila. 1940 Apr-June Vol. 8 No 2 pp 151-158 [17 refs.] L R

This further paper on the lepromin test has led the author to the following conclusions —

1 Of forty-eight hospital patients with lepromatous leprosy in various states of lepra reaction that were tested with lepromin only four or 8.3 per cent. gave clear-cut positive reactions—one 3+ and three 2+. The 1+ reactions are considered not significant, a point to be discussed in a subsequent paper

2 Irrespective of whether the patients were in the reaction state or not retests made from two to four months after the original ones tended to give from slightly to moderately stronger lepromin reactions in twenty four out of forty-eight patients (including the controls) that were retested.

3 No apparent relation in the intensity of the lepromin test to the presence of lepra reaction can be shown in the different groups into which the cases had been arbitrarily classified

4 Similarly no deductions can be made concerning the intensity of the lepromin test in relation to the time of the injection after the onset of lepra reaction in the mild or mild brief and mild recurrent cases

5 From the results of these studies, no apparent conclusion can be drawn to support the hypothesis that lepra reaction is a manifestation of allergy. Lepra reaction remains an obscure condition.

L R

ERMAKOVA (N I) The Histopathology of the Reactive Phase of Lepromatous Leprosy.—*Internat J Leprosy* Manila. 1940 Apr-June. Vol. 8 No 2. pp 159-166 With 11 figs on 2 plates.

Material obtained from a patient with lepromatous lesions who died during a reaction has been studied histologically by the author. He concludes that the reactive stage of lepra fever represents an allergic state. Degenerative and necrotic changes occurred in the smooth muscles and haemorrhages and necrosis were met with. Numerous lymphoid plasma and polymorphonuclear cells were noted. Where suppuration developed in the reactive nodules considerable degeneration of the bacilli even to the loss of acid fastness occurred. The invading polymorphonuclear leucocytes exercise a fermentative action upon the cells of the specific granuloma and the bacilli

L R

DR BARROS (José Mendonça) Aspectos clínicos do comprometimento ocular da lepra. [Some Clinical Aspects of the Ocular Involvement in Leprosy.] Serviço de profilaxia da lepra do estado de São Paulo-Brasil. Quarta Monografia dos Arquivos do Sanatório Padre Bento. 1939—pp 1-47 English version pp 49-79 With 60 coloured figs. on 31 plates & 37 figs.

coach which must then be subsequently disinfected. MUIR supports Mosser to the extent of maintaining that in a closed case the physician could refuse to make a definite diagnosis of leprosy and could label it neuritis or dermatitis or any other general term thus overcoming difficulties due to unreasoning prejudice. However the laws of the United States and the Belgian Congo make no difference between closed and open cases. BURNET agrees that closed cases should remain free and at liberty to travel, especially if going to an institution for treatment which seems reasonable, and others agree that infection from such is very unlikely but BRIERCLIFFE insists on special conditions for their travel. It appears to be clear that century-old prejudices on the subject will not be overcome until the question is threshed out by some authoritative body such as the International Leprosy Association.

L. R.

BUKER (Richard S.) *Leper Colonization of Kengtung State, Burma.—Internat J Leprosy* Manila. 1940 Apr-June. Vol. 8. No. 2. pp. 167-178 With 1 fig

This report deals with a leper colony in a Shan State of Upper Burma, opened in 1929 the inmates of which increased from 23 in 1930 to 225 in 1938. Homes are provided for uninfected children, and any male leper who wishes to marry must first be sterilized. Injections are given twice a week. At present nine colonies have been established with over 900 cases under treatment at a low cost.

L. R.

SITANALA (J. B.) *Het probleem der leproserieën in Nederlandsch-Indië [Leprosaria in the Netherlands Indies].—Geneesk. Tijdschr v Nederl Indië* 1940 May 28. Vol. 80 No. 22. pp. 1370-1380 With 1 map

The author gives a historical sketch of leprosy measures in the Netherlands Indies from 1655 to the present time. He states that there are now 47 leprosaria harbouring 4,955 lepers. Five of the institutions aim definitely at combating the disease the remaining forty-two dealing with the leper from the philanthropic aspect. He draws up a table showing how the modern leprosarium differs from those of former days, in looking after patients in all stages, and not excluding infectious cases in caring for and educating the children of lepers, in giving lepers occupation and useful work, and so on.

H H S

KRAKOWER (Cecil) & GONZÁLEZ (Luis M.) *Mouse Leprosy.—Arch. Pathology* 1940 July Vol. 30 No. 1 pp. 308-329 With 7 figs [15 refs]

"Ordinary albino mice and rats are susceptible to infection with a bacillus of mouse leprosy originally derived from a brown mouse with the spontaneous disease. Subcutaneous, intramuscular and intraperitoneal routes of inoculation were employed. In both animals the resulting experimental disease is entirely comparable to that produced in rats by Stefanaky's bacillus of rat leprosy. The lepromas in the rat and mouse differ in size in some of their gross features and particularly in their histologic and cytologic structure. In view of the apparent greater infectiousness of the bacilli of mouse leprosy for mice as compared with that of the rat strain it is felt that there is probably some inherent biologic difference between the two."

BADGER (L. F.) & FITE (G. L.) III. Leprosy Variations in the Virulence of Strains of Rat Leprosy.—*Nat Inst of Health Bull No 173* Wash. 1940 pp 77-83

Three strains isolated from wild rats and maintained in their laboratory have been studied by the authors by inoculation methods. Definite variation in virulence has been noted as shown by earlier generalization of the Hawaiian and Florida strains as compared with the San Francisco strain the first named being the most virulent of the three as shown by involvement of the liver and skin. This they regard as of great importance. L R

FITE (G. L.) II. Leprosy the Pathology of Experimental Rat Leprosy.—*Nat Inst of Health Bull No 173* Wash 1940 pp 45-78 With 8 figs on 4 plates. [28 refs]

This is a historical review from which the following conclusions are reached. On the subcutaneous inoculation of rat leprosy bacilli they are ingested by polymorphonuclear leucocytes. The giant cells are formed by the fusion of histiocytes mainly in newly formed foci. The chief defence consists in the localization and fixation of the bacilli within the lepra cells at the site of their deposition. L R

RIBEIRO (Fonseca) Murine Leprosy and Carotinoids.—*Internat J Leprosy* 1940 Apr-June Vol. 8 No 2. pp 179-192.

The author has separated three fractions from certain vegetable carotinoids and experimented with them in the treatment of murine leprosy. The A fraction consisting of a resinous substance yellow soluble in fatty solvents and also in alkaline solutions had the effect of altering the distribution of injected living rat leprosy bacilli so that their incidence resembled that of injected dead bacilli namely that pieces of liver were negative instead of being positive as after the injection of the living organism. The other two fractions were without such effect. L R

BADGER (L. F.) MASUNAGA (E.) & WOLF (D) Leprosy Vitamin B₁ Deficiency and Rat Leprosy.—*Public Health Rep* 1940 June 7 Vol 55 No 23 pp 1027-1041 With 2 figs.

In view of the common belief in a relationship between nutrition and human leprosy the authors have made nutritional studies on rat leprosy with regard to Vitamin B₁ from which they come to the following conclusions. In rats on a diet deficient in vitamin B₁ the incubation period of rat leprosy is shorter than in controls and the evidence indicated that this is due to an interference with the cellular defence mechanism of the animal. Susceptibility is also increased as shown by gross evidence of generalization of the infection due to the vitamin deficiency. Rats maintained on a calcium deficient diet are approximately as susceptible as those on a vitamin B₁ deficient diet and they were found also to be deficient in the vitamin through inability to utilize the amount available in the diet but this increased susceptibility is prevented if the calcium deficiency is supplemented by pure vitamin B₁. L R

that the specific characters are constant after many passages by mosquito transmission and are not the result of other factors such as those which Dr Bagster WILSON himself has shown may affect the morphology of *P. falciparum* (see this *Bulletin*, 1939 Vol. 38, p. 676). To the reviewer it would seem that in the case of parasites which appear to occupy an intermediate position between any two of the well-known forms as the one under discussion undoubtedly does, there can be no final agreement till the proof which will establish its validity as a new species is forthcoming, and it is his opinion that till the proof is forthcoming it is always a pity to introduce new names into medical literature.]

C. M. Wenyon.

CAMBOURNAC (José C.) L'Institut de Malariologie de Aguas de Moura (Portugal) [Institute of Malariology at Aguas de Moura, Portugal].—*Rev. du Paludisme et de Méd. Trop.* Paris. 1940. May 15 Vol. 2. No. 11 pp. 129-134 With 1 fig.

With the collaboration of the Health Division of the Rockefeller Foundation a Malariological Institute was constructed in 1938 at Aguas de Moura a small village 20 kilometres to the east of Setubal, in one of the most malarious regions of Portugal. It is now the centre of malaria studies for the whole country and courses of instruction are given to doctors, engineers and subordinate personnel. The paper also contains some general information regarding the prevalence of malaria in Portugal.

Norman White

ANDREWS (Justin) FAUST (Ernest Carroll) & WATSON (Robert Briggs) Recent Advances in the Epidemiology of Malaria.—*Southern Med. J.* 1940 Aug Vol. 33 No. 8 pp. 883-887 [33 refs.]

PIOW (Lan-Chou) The Egg of *Anopheles (Myzomyia) pattoni* Christophers.—*Chinese Med. J.* 1940 Mar Supp. 3. pp. 300-303 With 5 figs on 1 plate.

PIZZILLO (Giuseppe) Splenomegalia malarica tromboflebitica e adrenoterapia venosa. [Malarial Splenomegaly and Venous Thrombosis treated with Intravenous Adrenalin].—*Riv. di Malariologia* Sez. I 1940 Vol. 19 No. 2 pp. 97-110 With 4 figs. [18 refs.] German summary (8 lines)

The author describes a case of malarial splenomegaly in which venous thrombosis developed. The patient when admitted to hospital was submitted to Ascoli's adrenalin treatment which however failed to effect any reduction in the size of the spleen. Towards the end of the course of treatment after the 20th injection the patient had a copious hæmatemesis followed by abundant melaena. Radioscopic examination failed to reveal any organic cause for this hæmorrhage. Fifteen days later ascitic fluid began to accumulate. The patient though seriously ill returned home he was readmitted to hospital some six weeks later. Splenectomy was performed the patient died. The author states that the complete absence of splenic contraction in response to adrenalin treatment is an indication of the existence of phlebotic thrombosis and affords the possibility of timely surgical intervention splenectomy is the only possible cure.

N. W.

PANSINI (G) CACCURI (S) COPPA (E) & PARISE (N) Impiego di prodotti antimalarici e di metodi coadiuvanti. [Use of Antimalarial Preparations and of Accessory Methods].—*Riv di Malarologia* Sez. I 1939 Vol. 18 Nos. 5 & 6 pp 277-298 337-360 and 1940 Vol 19 Nos 1 & 2. pp 20-38 69-96 With 17 graphs English summary

This series of papers relates in considerable detail the therapeutic results achieved by the administration of most of the usual and some unusual, antimalarial remedies in the treatment of malaria patients invalided home from Italian East Africa to the Alessandro Mussolini Hospital in Aversa. Altogether the observations cover some 3 000 cases. Groups of patients were treated by different methods. One group received no specific treatment at all—some of these patients improved considerably—a fact which illustrates the beneficent action of time change of climate rest good food and social care on the evolution of the disease. The methods of treatment used include Ascoli's method quinine atebryn atebryn and quinine atebryn and surrenasi antimony tartrate intravenously according to de Nunnos method M_2 emopurina, and Grego's potion. The last two appeared to have little if any therapeutic value. From the manner in which the results are presented it is not possible to assess the relative values of the various remedies. In general the observations confirm accepted ideas as to their value and their limitations. The course of the disease was on the whole benign.

A W

YUGE (Goro) Ueber das Verhalten der Retikulozyten bei Malaria Tropica im Kindesalter. Eine hamatologische Studie. [Reticulocytosis in Subtertian Malaria in Children].—*Acta Japonica Med Trop Formosa* 1940 Mar Vol. 2. No 1 pp 191-199 With 1 fig

To ascertain whether reticulocytes can be used as a criterion for the regenerative action of an antimalarial remedy the author studied 11 children treated with atebryn and plasmoquine. He observed that a week's treatment induced a striking increase of the reticulocyte count and concluded that this indicated a regeneration process. At the same time he noted that the swelling of the liver and spleen reached a maximum prior to the appearance of the reticulocytosis and will investigate this point further.

W P Kennedy

CANNISTRACI (Salvatore Carlo) Cura e profilassi della malaria con i preparati sintetici. [Cure and Prophylaxis of Malaria with Synthetic Products].—*Riv di Malarologia* Sez. I 1940 Vol. 19 No 2. pp 118-120 French summary

In Messina the author treated 192 cases of malaria with atebryn 0.3 gm. a day for 6 days followed after an interval of 2 days by plasmoquine, 0.03 gm a day for 4 days. A second course of treatment was given two months later. The results were good there was no drug intolerance and no relapses. These drugs were also used as prophylactics—among 242 persons so treated there were only 3 cases of malaria as compared with 126 cases among 854 persons receiving quinine prophylactically. As a prophylactic atebryn 0.3 gm. on one or two days a week is recommended—children support this dose.

N W

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FEDERATED MALAY STATES ANNUAL REPORT OF THE INSTITUTE
FOR MEDICAL RESEARCH FOR THE YEAR 1938—[Malaria pp 97-
113 FIELD (J W)]

On a tea estate in an isolated tract of hilly country inhabited by 700 Tamil immigrants observations were made as to the value of plasmoquine as a prophylactic of malaria. Malaria is hyperendemic on this estate and due largely to *P vivax*. Breeding of the vectors *A. imbricatus* and *A. novumbricatus* is uncontrolled. Plasmoquine was given to practically the whole population during nine months. Adults received 0.02 gm twice a week. Children received smaller doses. In spite of the administration of plasmoquine malaria incidence remained high. Large numbers of *P vivax* gametocyte carriers persisted. The incidence of infected wild-caught mosquitoes was approximately the same as during the previous year when only schizonticidal drugs were used for prophylaxis. Uninfected new arrivals and infants became infected within a few months of arrival or birth. Attempts to infect mosquitoes from *P vivax* gametocyte carriers receiving plasmoquine were inconclusive. Some gut infections were obtained but hitherto no gland infection.

An inquiry on a hilly rubber estate with malaria of moderate endemicity showed that 0.3 gm. of atabrin once a week is more effective in reducing the incidence of clinical malaria than is 0.3 gm a day for five successive days every five weeks.

Forty-six cases of malaria were treated with Certuna. The cases were controlled in the careful manner which is characteristic of the work of this Institute. Doses varied from 0.03 gm. daily for five days to 0.06 gm daily for 10 days. The drug has no action on the asexual forms of *P. falciparum* it has a destructive action on crescents similar to that of plasmoquine. It has no effective action on either the asexual forms or the gametocytes of *P. vivax*. Certuna was well tolerated but in one case it may have been responsible for very severe toxic effects on the central nervous system.

Two preparations Malarin and Malarin were both found to be of negligible value in the treatment of malaria. Prontosil is of small value in the practical treatment of malaria owing to its low efficiency and high cost. A Granulate a new compound allied to atabrin in the form of yellow granules of sweetish taste especially intended for administration to children was found to be less effective than atabrin in the treatment of acute malaria.

N IV

CLARK (H. C.) Review of Recent Research on Drug Prophylaxis and Treatment of Malaria. A Report to the National Malaria Committee. —*Southern Med J* 1940 Aug Vol. 33 No 8 pp 879-882. [32 refs.]

SCHULEMAN (W) Zur Pathologie der Malaria [The Pathology of Malaria.]—*Deut Med Woch* 1940 Mar 8 Vol. 66 No 10 pp 253-256 With 1 fig [23 refs.]

This is a résumé of work done in the last few years on the pigment-free parasites of bird malaria which are known as exo-erythrocytic forms. No new work is reported. The author shows a graphic schema in which the course of infection in birds is demonstrated. Sporozoites enter the cells of the reticulo-endothelial system and undergo a

cycle of development during which the parasites are free from pigment. The merozoites resulting from this may again enter the R.E.S. and undergo the same cycle, or may enter the erythrocytes in which case the ordinary pigmented forms are produced. Merozoites resulting from this cycle may continue the erythrocytic cycle, or may enter the R.E.S. to undergo the pigment free exo-erythrocytic cycle or may give rise to gametocytes. The work on which this paper is founded has been largely abstracted in this *Bulletin*. [References to exo-erythrocytic schizonts may be found in this *Bulletin* 1939 Vol. 36 p. 279 and 1940 Vol. 37 pp. 247-248.] C II

KITCHEN (S. F.) HUFF (Clay G.) & ROX (Maurice A.) A Review of Recent Experimental Studies in Malaria.—*Southern Med J* 1940 Aug Vol. 33 No. 8 pp. 887-892. [90 refs.]

HELMINTHIASIS

PRECIS OF ABSTRACTS IN THIS SECTION

General CAMERON (p. 38) reports on experiments into the possible means of eliminating animal parasites from manure. Over 100 chemicals were tested and the most useful was found to be urine which when added to fresh faeces is capable of killing free living sclerostome larvae.

GUNWARDENE (p. 38) shows that tetrachlorethylene can decompose to phosgene if exposed to light. MORLEAU (p. 38) describes a body found in human faeces in Madagascar which he regards as probably the egg of a worm. No adult has been found.

YOSINO and NARASATO (p. 39) report on helminth infection in schoolchildren in the Okinawa Prefecture.

Trematodes—SARADINI and LEBERT (p. 39) have reported a new focus of urinary schistosomiasis in a coastal area of Algiers which has hitherto been regarded as free from this infection. *Buhus contortus* is present in the irrigation canals. GREIG (p. 40) described a case of urinary schistosomiasis. L'ABBATE (p. 40) reports urinary schistosomiasis probably acquired in the Lake Tana area.

CAWTON (p. 40) notes that the pyrocatechin component of Fouadin is toxic.

MOHAMED (p. 40) distinguishes between the bilharzial appendix, in which there are ova in the tissues with cellular reaction and bilharzial appendicitis, in which bacteriological infections are superimposed. Symptoms resembling those of appendicitis may in fact be caused by bilharzial infection of the colon or urinary tract, and in this case cure may be obtained by anthelmintic treatment. Similarly bilharzial infection of the gall bladder is not an isolated infection but is part of a general infection. The main infection is in the subserous tissues. Mild infections probably do not cause symptoms and for patients with signs of cholecystitis in the presence of bilharzia, drug treatment should be tried for some time before operation is undertaken. The ova probably do not become the nuclei of gallstones.

BRUMPT (p. 41) describes the invasion of the tentacles of *Planorbis glabratus* by the miracidia of *Schistosoma mansoni*. The first signs of invasion are swellings on the tentacles. Development of primary

sporocysts and migration of daughter sporocysts take place more quickly at 25 C. than at 17°C. He points out that the eggs of *S. mansoni* do not open at once in a hypotonic medium as do those of *S. haematobium* and suggests that opening of the egg is effected by activity of the miracidium.

MARTINS (p 42) regards a number of specific names in common use as synonyms of *Australorbis glabratus*. This snail is the intermediate host of *S. mansoni* in America.

ROBERTSON (p 42) reports endemic *S. japonicum* infection in W. Yunnan and infected snails of the genus *Katayama*. YAO (p 43) found eggs of *S. japonicum* in 106 of 191 stools examined in the Kwangsi province. Oncomelania from streams and irrigation ditches were found to harbour cercariae. GARCIA *et al* (p 43) found eggs of *S. japonicum* in the tissues of a leg ulcer in a child in the Philippines.

WU (p 43) reports on the reservoir hosts of *S. japonicum* in China. Sheep, goats, dogs, cats, cattle, rats and horses have been found to be infected and pigs though not yet found infected in nature are sensitive. These hosts must obviously be taken into account in considering prevention and control of human infection.

CORT *et al* (p 44) show that in N. Michigan the schistosome which causes dermatitis is *S. stagnicolae* and that the long life and characteristics of the seasonal cycle of the snail host *Stagnicola emarginata* are factors influencing the occurrence of this lesion. BRACKETT (p 44) has studied schistosome dermatitis in Wisconsin and points out that the condition does not warrant the alarm sometimes aroused in the public. He (p 44) has made observations on the behaviour of the cercariae which cause schistosome dermatitis.

KOMIYA and TAJIMI (p 44) discuss the structure of the cercaria of *Clonorchis sinensis* and record a new second intermediate host *Squaliobarbus curriculus* in the Shanghai area. GALLIARD *et al* (p 45) state that infection of the pancreas by *Clonorchis sinensis* is not rare in Japan and describe two cases seen in Tonking. Both patients died and the pathological changes are described.

KINUGASA (p 45) found infection with *Paragonimus westermani* in 5.53 per cent of children in Sintiku; in some parts it was as high as 45.16 per cent. Most of the infections are due to eating raw crabs of the genus *Potamon*. WU (p 46) details the reservoir hosts and the snail hosts of *Paragonimus* in China. Crabs are eaten uncooked or slightly cooked or after being immersed in wine which may not be enough to kill even the crabs. Crabs are sold as cooked or drunken crabs.

WU (p 46) discusses *Paragonimus* infection in leopards and tigers in China.

YOKOGAWA *et al* (p 47) show that in experiments on a few dogs infected with *Paragonimus westermani*, treatment with intramuscular prontosil soluble (2.5 per cent.) and emetine brought about rapid and radical cure whereas emetine alone was unsuccessful. The combined treatment was then given to 9 human patients. Of these 4 were apparently cured, 2 could not be followed up, 2 relapsed and 1 died of unrelated disease. The method is therefore worth further trial. Full details of dosage are given.

WU (p 48) mentions certain snail hosts of *Fasciolopsis buski* which are not commonly known. BRUMPT *et al* (p 48) have incriminated *Limnaea bogotensis* as a snail host of *Fasciola hepatica* in Colombia.

CAMERON (Thomas W. M.) *The Principles of Parasite Control*.—48 pp. With 3 figs. 1940 Gardenvale Quebec National Business Publications, Ltd. [In Canada 50 cents in Great Britain 2s. 6d.]

This monograph deals with the principles of control of animal parasites as applied to veterinary practice.

Its subject matter is that of three lectures delivered under the auspices of the London University at the Royal Veterinary College in September 1938. It recalls that Maurice C. HALL stressed the need for investigation into the best means of eliminating animal parasitic elements from manure—that matter has been taken up in Hall's own department in the United States and at the Institute of Parasitology in Canada. At the latter over 100 chemicals have been tested with this aim and the most useful has been urine. Speaking generally the addition to fresh faeces of a third of its weight of urine kills the free-living stages of *asclostomes*. Urea in strength of 0.75 per cent. Calcium (an artificial fertilizer) in that of 1.25 per cent. and some other stated drugs are effective. The effects of heat drought light and ordinary agricultural procedures are noted as are those of treatment and of reservoir hosts. It is emphasized that the application of principles must vary with conditions, and that the subject has no finish.

Clayton Lane

FRANKE (H.) *Die Bedeutung der Hautreaktion für die Diagnose von Darmparasiten*. [The Skin Reaction in the Diagnosis of Intestinal Parasites].—*Deut. Med. Woch.* 1940 Mar 8 Vol. 66 No. 10 pp. 238-239.

GUNewardene (S. R.) *Decomposition of Tetrachlorethylene*.—*N. Ceylon Branch Brit. Med. Assoc.* 1940 Mar Vol. 37 No. 1 pp. 47-48.

Tetrachlorethylene can decompose into phosgene if exposed to light. This paper is a sequel to the author's earlier paper (this *Bulletin* 1939 Vol. 36 p. 832) in which he pointed out the serious symptoms which in Ceylon have followed administration of this drug and in which he mentioned phosgene as present in the bottles from which the drug was taken. Here investigation by J. V. COLLINS the Government Analyst, of the conditions which favour this change is reported. Bottles were exposed to light were stored in a refrigerator or were stood in the dark—there was formation of phosgene in the first only of the three series. This impurity has been stated by LAMSON to be no serious complication, but Gunewardene points out that phosgene is a dangerous lung irritant, so that to test for its presence by smell a deep breath should be taken and the test made by a gentle sniff, and if the presence of phosgene is detected quick and complete expiration should be made.

C. L.

MOREAU (P.) *Note au sujet d'un œuf de configuration spéciale rencontré dans les selles à Madagascar*. [An Egg of Distinctive Shape in Stools in Madagascar].—*Bull. Soc. Path. Exot.* 1940 Apr 10 Vol. 33 No. 4 pp. 295-296. With 2 figs.

A report from the clinical laboratory of the hospital at Fianarantsoa of what seem to be peculiar eggs found in the stools of 25 persons in a series of examinations over 2½ years.



Peculiar egg found in stools in Madagascar

[Reproduced for the *Bulletin de la Société de Pathologie Exotique*]

The body in question is nearly circular but having at one pole a triangular projection designated a clasp (lid or valve) its size is between that of an ascaris and a trichuris egg and the persons who passed these bodies suffered from asthenia and intestinal troubles. Adult worms have not been found either on straining the stools or after using the duodenal sound. C L

YOSINO (Takayosi) & NAKASATO (Tyotei) On the Prevalence of Intestinal Parasites among Primary School Children in Yaeyama County Okinawa Prefecture.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1940 Aug Vol 39 No 8 [In Japanese pp 1162-1169 [10 refs.] English summary p 1169]

The authors made a faecal examination of 1765 primary school children (958 males and 807 females) in Yaeyama County Okinawa Prefecture. The results of the examinations are shown in the following table [of the non-infected 123 (12.84 per cent) were males and 149 (18.46 per cent.) females] —

	Number	Per cent
Non infected	272	15.41
Infected	1493	84.59
Hookworm	577	32.69
<i>Strongyloides stercoralis</i>	196	11.10
<i>Ascaris lumbricoides</i>	857	48.55
<i>Trichocephalus trichiura</i>	802	45.44
<i>Enterobius vermicularis</i>	39	2.21
<i>Taenia solium</i>	5	0.28
<i>Hymenolepis nana</i>	31	1.78
<i>Hymenolepis diminuta</i>	4	0.23

H H S

HOEPLI (R.) & CHANG (I hung) The Origin of Human Helminths according to Old Chinese Medical Literature.—Reprinted from *Monumenta Serica* Peiping 1938 Vol. 3 No 2. pp 579-601 With 6 figs. [25 refs.]

SABADINI (L.) & IMBERT (Marc) A propos d'une épidémie de bilharziose urinaire en Algérie. Remarques et déductions. [An Epidemic of Urinary Bilharziasis in Algeria.]—*Mém Acad de Chirurg* 1940 Vol. 66 No 1-2. pp 14-19

Though the Algerian littoral has hitherto been free from urinary schistosomiasis an epidemic of this, recognized by the presence of

eggs is here reported from Saint Aimé (Department of Algiers) in Europeans and natives.

It is true that at the oasis of Djanet some 800 miles away across the Sahara, this infection has been reported [RAYNAUD this *Bulletin* 1927 Vol 24 p. 515 and 1936 Vol 33 p. 10] and that it is present in Morocco but hitherto coastal Algeria has been held free from indigenous infection. *Bilharzia contorta* is scattered over its irrigation canals. Cystoscopic examination of 120 Senegalese soldiers all strong and healthy looking is said to have shown lesions in 80 per cent., though they had no haematuria and no symptoms. C. L.

GREIG (E. D. W.) Case of Urinary Bilharziasis showing Marked Anaemia and Resistance to Antimony Treatment.—*Jl Trop Med & Hyg* 1940 Sept 2. Vol 43 No. 17 pp 227-229

This patient had had about a dozen intravenous antimony injections for recurrent attacks of haematuria.

He came into the Royal Infirmary Edinburgh with the history that he became ill after bathing at Victoria Falls, S. Africa and that bilharzia ova had then been found in the urine. He was very pale, red cells 2,700,000 haemoglobin 40 per cent. eosinophils 4 per cent., no bilharzia ova. The treatment was by intramuscular founadin injections to a total of 40 cc in 15 days, and ferrous sulphate and liquor arsenicalis by mouth. The case is discussed but it is too early yet to assess the result of treatment. C. L.

L. ABBATE (G.) Contributo allo studio della distribuzione geografica della bilarzia vescicale [The Distribution of Vesical Schistosomiasis].—*Rivista Sanitaria dell'A.O.I.* Addis Ababa 1939 Sept. 9 Vol 1 No 3 pp 43-45

Report of urinary bilharziasis with many eggs in the urine in a man seen in Gondar and coming from northern Goggiam. It was probably acquired from the water of Lake Tana or its affluents. C. L.

GELFAND (Michael) & DAVIS (G. B.) Bilharzial Lesions of the Testis.—*South African Med Jl* 1940 Sept 14 Vol 14 No 17 pp 334-335

CAWSTON (F. Gordon) Founadin in Bilharziasis. [Correspondence].—*Lancet* 1940 June 29 p 1178

Cawston notes that the difficulty of giving an adequate dose of antimony in founadin lies in the toxic action of its pyrocatechin perhaps in anthraquinone the arsenic is present in a combination that allows of a smaller dose at least with infections by *S. haematobium* alone. C. L.

i. MOHAMED (Abdel Shafi) Bilharziasis and its Relation to Appendicitis.—*Jl Egyptian Med Assoc* 1940 Jan. Vol 23 No. 1 pp 1-30 With 2 figs [21 refs.]

ii.—The Role of Bilharziasis in the Production of Cholecystitis.—*Ibid* Mar No 3 pp 116-139 With 3 figs

i. It is insisted that bilharziasis of the appendix is part of a wider infection and that there must be a clear distinction between the bilharzial appendix (in which there are numbers of ova in the tissues

with infiltration by active cells of the reticulo-endothelial system or as the author puts it with histiocytes giant cells eosinophil cells lymphocytes fibroblasts and connective tissue fibres) and bilharzial appendicitis (in which bacterial infections are superimposed with their characteristic histological reactions)

The material on which comment is made consists of records of 12 autopsies in none of them was the fluke infection confined to the appendix and in most that infection was severe either in the intestinal or in the urinary tract or in both. On the other hand appendices were normal in 17 per cent. of 206 removed by operation at the Kasr El Ami Hospital and the appendicular symptoms are ascribed to the results of infection of the colon or urinary tract or both so that permanent cure could have been got by antimony or other anthelmintic treatment after the presence of bilharzia infection had been proved by ova in the faeces of urine or suggested by eosinophilia.

11. Again there is insistence that bilharzial infection of the gall bladder does not occur in an isolated or primary form that bacterial infection with inflammation is a secondary infection and that the proper treatment of the worm infection is by drugs. From the autopsy records are collected 10 cases of bilharzial infection of the gall bladder and in all there was infection elsewhere three more are added in which this organ escaped infection though this was present in the surrounding viscera. In 8 of the 10 cases the livers were infected all but one showing bilharzial cirrhosis and splenomegaly while in 9 of the 10 there were ova in the colon wall. Of 13 bilharzial gall bladders examined there were ova on the submucosa and in one or both of the muscular and subserous coats. In general the distribution is of the kind present in other hollow viscera but it is apt to show fewer ova with their main concentration in the subserous coat. It is held questionable whether mild degrees of infection give rise to symptoms. At operations for chronic cholecystitis 21.9 per cent. of normal gall bladders have been removed, so that when investigations point to any bilharzial infection the patient should be given the chance of medical treatment for 2 or 3 months a procedure which it is believed would give most of them a permanent cure. It is not thought that the ova may become nuclei for gallstones. C L

BRUMPT (E.) Confirmation des observations de A. Lutz sur les lésions tentaculaires de *Planorbis glabratus* (= *P. guadeloupensis*) déterminées par l'évolution sur place des miracidies de *Schistosoma mansoni*. [Confirmation of Lutz's Observations that Lesions in the Tentacles of *P. glabratus* are determined by the Development in situ of Miracidia of *S. mansoni*].—C R Soc Biol 1940 Vol. 133 No 4 pp 625-628 With 1 fig

These lesions described by Lutz in 1919 and apparently by no one else since are substantiated and described.

The snails were infected in a Petri dish at 27°C to 30°C in water which contained eggs of *S. mansoni*. The miracidia probably penetrate all parts of the molluscan body as well as the tentacles and foot where Brumpt found them. About the fourth day of infection, in infected tentacles cut off and examined between slide and cover there are oval parasites measuring 100μ by 70μ without cilia but with active flame cells the primary sporocysts. On the 7th to 8th day at 17°C. (but sooner at 25°C) the tentacles show white lumps standing out on the

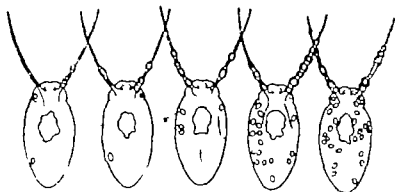


Figure showing from left to right the effects of the entry of increasing numbers of miracidia 18 days after infection. Primary sporocysts lying in the tentacles are producing secondary sporocysts which are on the point of migrating into the visceral mass of the mollusc.

[Reproduced for the *Comptes Rendus de la Société de Biologie*]

red background, these primary sporocysts now measuring 300μ to 500μ , and growing till the 20th day when they reach a diameter of 1500μ and contain up to 250 daughter cysts, this high figure being perhaps the products of several miracidia. At a temperature of 25°C , the daughter cysts start migration to the hepato-pancreatic gland, grow there and set free cercariae in the 6th week. From one stock of *P. glabratus* in Caracas Brumpt obtained these tentacular swellings in nearly all snails, and in 14 of 16 snails there were primary sporocysts in the foot. The eggs of *S. mansoni* do not as do those of *S. haematobium* open at once in a hypotonic medium perhaps it is a miracidial activity that effects hatching. C. L.

MARTINS (A. Viana) Contribuição ao estudo do gênero *Australorbis* Pilsbry 1934 [Contribution to the Study of the Genus *Australorbis*]
—*Mem. Inst. Biol. Exequiel Dias* 1938, Vol. 2, pp 5-61 With 6 plates (1 coloured) [58 refs.]

It is held that the intermediate host of *S. mansoni* in America is *Australorbis glabratus* (Say 1818) Pilsbry 1934 and that the names *Planorbis guadaloupensis* Sowerby 1821, *P. olivaceus* Spix, 1827, *P. nigricans* Spix, 1827, *P. swinhonis* Lutz 1918, *P. centralis* Lutz 1918 and perhaps *P. peregrinus* d'Orbigny 1847 are synonyms given to members of a variable species. C. L.

ROBERTSON (R. Cecil) Schistosomiasis in the Tali-Fu Region of Yunnan Province.—*Chinese Med J* 1940 Apr Vol. 57 No 4 pp 358-363. With 2 figs on 1 plate. [16 refs.]

The author who is Professor of Pathology Hongkong University and Chief Technical Expert League of Nations Epidemic Commission, reports endemic infection with *S. japonicum* in Tali-fu and Fenggh district including the Hsiakwan region on the West Yunnan plain. Infected snails undoubtedly belonging to the *Katayama* group were found in irrigation ditches in October 1939. C. L.

10 (1 T) **Schistosomiasis in the Pingyang District, Kwangsi.**—
Far Eastern Assoc Trop Med C R Dixième Congrès Hanoi
26 Nov-2 Dec 1938 Vol. 2. PP 727-739 With 6 figs on
2 plates. [17 refs]

In a village of the Pingyang District Kwangsi Province many of the inhabitants were observed to have protuberant abdomens and investigations showed that the condition had been known to exist there for more than half a century. About half the families were attacked both sexes males more than females and death usually occurred within 10 perhaps within 5 years of the abdominal enlargement becoming obvious. Further investigations revealed that the condition was a schistosomiasis due to *Sch japonicum* of 191 stools taken at random for examination 106 (55.5 per cent) contained the characteristic ova. Oncomelania (not *nosophora* nor *kupensis*) were collected from streams and irrigation ditches in the village and 7.8 per cent. (72 out of 916) harboured the cercariae and these infected experimental rabbits.

GARCIA (Eusebio I) & NAVARRO (Regino J) & BAUTISTA (Laureano)
A Case of Cutaneous Schistosomiasis Involving *Schistosoma japonicum* Eggs—*Acta Med Philippina* Manila 1940 Jan-Mar Vol 1 No 3 pp 339-345 With 6 figs on 3 plates.

A child of 10 suffered from a chronic ulcer of the leg biopsy showed eggs of *S japonicum* under the epithelium. She also had dysenteric symptoms with eggs of this parasite as well as of ascaris and trichuris in the faeces.

(Kuang) **Schistosomiasis japonica among Sheep and Goats with a Review of the Reservoir Hosts from China**—*Far Eastern Assoc Trop Med C R Dixième Congrès Hanoi* 26 Nov-2 Dec 1938 Vol. 2. pp 721-725 [10 refs]

Between March and June 1937 the author examined portions of the livers of 355 sheep from Shanghai municipal abattoirs and found *Sch japonicum* infection in six (1.7 per cent) whereas among 193 goat livers there were 18 or 8.1 per cent. This does not necessarily mean that goats are more susceptible than sheep the goats may have been brought to Shanghai from a region of greater endemicity. In the lower Yangtze delta faeces of sheep and goats are used for fertilizer hence the risk of human infection.

FAUST and MELENEY [this *Bulletin* 1925 Vol. 22 p 468] in their authoritative monograph found that dogs cats and imported cattle were reservoir hosts in China and stated that native oxen were reported to be immune and thought that man alone was the important definitive host. The author has by his studies shown this to be erroneous. He found infection in a house rat and thinks that there may be a high incidence among field rats in endemic centres it has been reported in dogs in Hunan Kuangsu and Chekiang and particularly among hunting dogs which enjoy aquatic life. Examination of 55 cats in villages in Chekiang showed six (9 per cent) to be harbouring *Sch japonicum*. In oxen the author has found it in percentages ranging between 0.8 and 34.4 with an average of 12.6 and in buffaloes 8.3 and 24.2 with an average of 18.7. Pigs he has not yet found naturally infected but experimentally they were sensitive. Four of 13 horses whose livers were examined in 1938 were found to be infected.

Clearly, then animals other than man are potential hosts of *Schistosoma* and the control and prevention of infection in man or animals must take account of these reservoir hosts.

CORT (W W) McMULLEN (D B) OLIVER (Louis) & BRACKETT (Sterling) Recent Studies on Schistosoma Dermatitis in the United States.—Rev Med Trop y Parasit Habana 1940 Mar-Apr Vol 8 No 2 PP 65-84 [23 refs]

Investigation on the cercariae that cause this dermatitis locally shows that

in the Douglas Lake region of northern Michigan the short life span of *Physa* *physalis* seems to be the chief factor that prevents its schistosome *C. physalis* from being a significant factor in the production of human dermatitis. On the other hand the longer life of the adults of *Stagnatula emarginata* and the characteristics of the seasonal cycle of its infection with *C. stagnatulae* make this schistosome certainly the important etiological agent of swimmers' itch on the bathing beaches and determines to a considerable extent the time at which the outbreaks occur

BRACKETT (Sterling) Studies on Schistosoma Dermatitis. V. Prevalence in Wisconsin.—Amer J Hyg 1940 May Vol 31 No 3 Sect D PP 40-63 With 1 map [19 refs.]

Exaggerated ideas have gained ground as to the prevalence of schistosoma dermatitis in Wisconsin

These outbreaks were most extensive in 1937 but questioning showed that few persons had up till then been infected in any particular locality. Since the cause was practically unknown the afflicted became scared and since it happened that the outbreaks occurred at times when many were using bathing beaches some of these got a bad name. In the next two years there was practically no dermatitis and with larval schistosomes but in view of the still largely unknown condition that favour their infection more and severer outbreaks of the dermatitis may occur there. If so a knowledge of their cause now produce no more anxiety among the infected than would the mosquito bites that so constantly occur among people locally C L

BRACKETT (Sterling) Studies on Schistosoma Dermatitis. VI. Re on the Behavior of Schistosoma Cercariae.—Amer J Hyg 1940 May Vol 31 No 3 Sect D PP 64-73 [10 refs]

The cercariae that produce dermatitis may be identified by their behaviour. Using this test it was found that emergence of the cercariae from snails followed a sudden rise in temperature or feeding of their hosts after starvation. Again they cling to plants, and contact with these may transfer them to men's surface in numbers on warm, sunny still days only [which presumably are just those on which bathing beaches are most popular] C L

HOSONA (Toshitaka) & TAJIMA (Tajima) Study on Clonorchis sinensis in the District of Shanghai. 5. The Cercaria and Metacercaria of Clonorchis sinensis with Special Reference to their Excretory System.—Reprinted from J Shanghai Sci Inst 1940 Feb. Sect 4 Vol 6 PP 91-106. With 11 figs on 7 plates. [21 refs.]

The body structure of the cercaria and metacercaria of Clonorchis sinensis particularly of their excretory system is described. The

flame cell pattern of the cercaria and the metacercaria is shown to be $2 \times [(3+3)+(3+3+3)]$. The development of the metacercaria of *Clonorchis sinensis* is traced experimentally. From these data the authors conclude that FAUST and others identified at least two different species of metacercariae, namely those of *Exorchis oviformis* and *Metagonimus* sp. as that of *Clonorchis sinensis*. *Bithynia striatulus* (Benson) is confirmed as the first intermediate host of *Clonorchis sinensis* in the Shanghai area. Two further second intermediate hosts of *Clonorchis sinensis* are confirmed in this area namely *Leucogobio polytaenia* and *Squaliobarbus curriculus*. The former has already been reported by HSÜ and KHAW as such in the Peiping area while the latter has never previously been described as such here and elsewhere. C L

YOSHINO (Keizo) Untersuchungen ueber die encystierten Zerkarien von Trematoden mit besonderer Berücksichtigung der jahreszeitlichen Veränderungen in *Carassius auratus* (Linnaeus). [Investigations on Encysted Cercariae of Trematodes with Special Reference to Seasonal Alterations in *C. auratus*].—*Okayama Igakkai Zasshi* (Mitt d Med Gesellsch z Okayama) 1940 Feb Vol 52, No 2 [In Japanese pp 274-306 German summary pp 307-308]

GALLIARD (Henri) DANG-VAN NGU & PHAN HUY-QUAT La distomatose pancréatique à *Clonorchis sinensis* au Tonkin. Etude anatomo-pathologique. [*Clonorchis sinensis* in the Pancreas of Tonkingese Subjects].—*Far Eastern Assoc Trop Med C R Dixième Congrès Hanoi* 26 Nov-2 Dec 1938 Vol. 2, pp 659-668 With 6 figs. on 3 plates [15 reits.]

Two cases are recorded and according to the authors two had previously been observed in Tonking. *Clonorchis sinensis* invasion of the pancreas is not by any means rare in Japan. KATSURADA found it in 11.8 per cent. of cases of infection. The two here described were men aged 39 and 40 years complaining of acute abdominal pain and oedema, diarrhoea in one jaundice in the other patient. General asthenia progressed and both died. The notable pathological changes in the pancreas were dilatation of the ducts and canals connective tissue reaction atrophy of the gland tissue with proliferation of epithelial layers like new gland formation. In one case there was marked capillary congestion and blood sinuses round the canals in other words sclerosis round the hypertrophied or dilated ducts and new gland tissue formation. Later the sclerosis increases and causes atrophy of the gland tissue inflammatory reaction congestion of vessels and local eosinophilia are marked. H H S

KINUGASA (Masaru) Investigation on the Incidence of Lung Fluke Disease (*Paragonimus Westerni*) in Sintoiku Prefecture. III. On its Incidence in the Children of Training Places for Aborigines in Sintoiku Prefecture.—*Taiwan Igakkai Zasshi* (Jl Med Assoc Formosa) 1940 Feb Vol 39, No 2 [In Japanese pp 227-235 English summary pp 235-236]

Examination of 1735 children of the aboriginal Takasago race showed lung fluke infection in 5.53 per cent.

The highest infections were in girls, and the highest age period was 10 or 11. In different places the infection rate varied from 0.72 to 45.16. Most infections it is believed, are due to the eating of *Polamon*.

rainbow and *P. dehaani* for these are caught near villages and are eaten raw whereas the large *Eriocher japonicus* is first boiled. C L

Wu (Kuang) The Epidemiology of Paragonimiasis in China.—*Far Eastern Assoc. Trop. Med. C R Dissem. Congrès Harbin* 26 Nov.—2 Dec 1933 Vol 2 pp 669-713. With 1 diagram, 3 plans 6 figs & 1 map. [44 refs.]

Human paragonimiasis is met with in China in the Provinces of Chekiang, Hupeh, Hunan, Yunnan and Liaoning, and perhaps in Fukien, Anhwei and Kwangtung in reservoir hosts—rat and dog in Kwangtung cat wild cat and leopard in Chekiang, leopard and tiger in Fukien. The snail hosts are *Melania libertina* and *Assuminea lutea* and the crab hosts *Potamon denticulatus*, *Parathelphusa sinensis*, *Senarma dehaani* and *S. sinensis*. *Eriocher sinensis* regarded as one of the secondary intermediate hosts, was not found infected, but the author did not examine very many of them. *Melania* and *Potamon* live in mountain streams, *Assuminea* and *Senarma* in delta regions.

Eating of crabs by the Chinese dates back almost certainly for 3 000 years (the Chow dynasty, B C 1115) and is common to-day. The dish may be well or slightly cooked, or uncooked more often the two former in Shaohing the last. By some the crabs are merely immersed in wine of varied alcoholic strength. In diluted millet wine (10 per cent alcohol) or in rice wine (14 per cent.) the encysted metacercariae are viable up to 43 and 18 hours respectively at room temperature (22°C). In Shaohing even lower strengths are used and the liquor may not cover the crabs and the fluid is left in contact for 12 hours or less, so that the cysts and crabs are still living and thus habit of devouring "drunken crabs" is prevalent, in fact the dish is sold in the restaurants either "cooked" or "drunken" H H S

Wu (Kuang) Paragonimus among Leopards and Tigers in China.—Reprinted from *Peking Natural History Bull.* 1933-39 Vol. 13. Pt 4 pp 231-245 With 5 figs & 3 plates. [21 refs.] [Henry Lester Institute of Medical Research Collected Papers 1933. Vol 7 No 41]

"1 A relatively high incidence of *Paragonimus* infection is found to exist among the leopard and the tiger in China, both being for the first time reported in this country. It is quite probable that the disease may be indigenous to Fukien Province.

2 Anatomical differences have not been noticed between the adult lung flukes from six Chinese leopards and one tiger and those of other animals described from North America or other Asiatic countries.

"3. In the present study the shape size and arrangement of the cuticular spines of *Paragonimus* are found to be very variable in individual specimens, so they are inadequate as a basis for distinguishing the species. The shape and size of *Paragonimus* eggs are also found to be very variable and cannot be said to have any specific differences.

"4 An epidermoid *Paragonimus* cyst with possible early carcinomatous changes was found in the lung of a tiger from Fukien."

- i YOKOGAWA (Sadamu) & RO (Mantoku) Studies on the Treatment of Paragonimiasis. Part I Experimental Treatment and Efficacy on Dogs harbouring Lung Flukes (*Paragonimus westermani*)—*Acta Japonica Med Trop Formosa* 1939 May Vol 1 No 1 pp 1-18. [23 refs]
- ii ——— WAKISAKA (Kenji) & SO (Kinza) Studies on the Treatment of Paragonimiasis. Part II On the Efficacy of Prontosil in Combination with Emetine against Lung Fluke Disease and Changes in the Eggs of Lung Flukes during the Treatment—*Ibid* 1940 Mar Vol 2, No 1 pp 23-54 With 32 figs on 2 plates [13 refs.]
- iii ——— & ——— Studies on the Treatment of Paragonimiasis. Part 2. On the Efficacy of Prontosil in Combination with Emetine against Lung Fluke Disease and Changes in the Eggs of Lung Flukes during the Treatment.—*Taiwan Igakkyo Zasshi (Jl Med Assoc Formosa)* 1940 Feb Vol. 39 No 2 [In Japanese pp 164-179 English summary pp 180-181 With 32 figs on 2 plates]

1. For the treatment of *Paragonimus* infection induced in three dogs the authors used intramuscular injections of prontosil soluble in strength of 2.5 per cent with emetine hydrochloride and found that it brought about rapid and radical cure.

The effects of successful treatment were that the oval eggs became globular the shells thin and irregular with faded colour though when they aggregated the colour was reported as deep brown the contents became fluid, with deposit of fat granules and vacuoles. Later the eggs disappeared from the sputum in dog 1 examined shortly after this the worms dead and degenerate were found in the cysts in dog 2 examined 20 days after the eggs disappeared no worms were found, there being only atrophied cicatrized and calcified cysts in dog 3 the treatment was twice stopped owing to the onset of debility and on its being given for the third time the dog died of debility and its lungs then contained eleven living and seven dead worms as well as 22 worm cysts of which 8 were empty. Ill effects are held to be due to emetine.

Control dogs were given emetine alone one showed no decrease in egg numbers in the sputum in the second and third at autopsy the numbers of worm cysts of living and of dead worms were 17, 23 and 3 in one and 14, 22 and (?) 2 in the other. The dosage causing disappearance of eggs was—for dog 1 weighing 17.7 kilos of prontosil 37.4 cc. and of emetine 0.145 gm. for dog 2 weighing 19.5 kilos. of prontosil 28 cc and of emetine 0.13 gm. in dog 1 the total quantities were—of prontosil 37.4 cc. and of emetine 0.145 gm. and in dog 2 were 28 and 0.128. In dog 3 weighing at first 17.28 kilos. the quantities given at the three courses of treatment were—of prontosil 37.4, 44.8 and 36 cc. and of emetine 0.145, 0.179 and 0.192 gm.

ii. The experience obtained on three dogs has been used for the treatment of nine human patients.

The treatment was by intramuscular prontosil, 2.5 per cent. to a total of 60 to 165 cc. and intravenous emetine hydrochloride 4 per cent. to a total of 12 to 23.5 cc. over a period of 7-17 days. In six patients treatment was continued till eggs after a temporary increase in number during the first four days disappeared from the sputum in three it was stopped when degenerative changes

in the eggs became conspicuous but in these the eggs decreased in numbers and finally were no longer found. When this degeneration has begun on the third day treatment has proved successful when, after beginning on the fifth or sixth day it becomes conspicuous only after 2 weeks, there is fear of relapse. The sputum decreases steadily haemoptysis ceases in 2 to 18 days and the rusty colour gives place to mucus. Of the 9 patients 2 could not be followed up 4 had no recurrence of symptoms five months later 1 died of unrelated disease and 2 relapsed with much haemoptysis, a condition the authors attribute to invasion of the lung. The blood showed eosinophilia in 7 anaemia in 4 and increased sedimentation rate in 7 treatment caused no alterations in the blood except for an unspecified change in the sedimentation rate in 2. The temporary disappearance of eggs in some cases suggests an early toxic effect on the ovary as in *Dirofilaria*.

iii This is a Japanese version of the work described in ii with an English summary. Once more it may be pointed out that had an English description of the excellent figures been given, the value of this summary would have been greatly enhanced. C. L.

WU (Kuang) Some Aspects of *Fasciolopsis buski*.—Far Eastern Assoc Trop Med C R Division Congress Hanoi 26 Nov-2 Dec 1938 Vol. 2 pp 671-684 With 5 figs on plates (1 map)

A useful paper showing the distribution of *Fasciolopsis buski* in man in China (see map) together with a list of the intermediate snail hosts and the aquatic plants on which they occur. The intermediate hosts mentioned are *Planorbis schmackeri* *P. coenosus* *Sermyndina nitidellus*, *S. calathus* *S. largillierii* *Hippidius carteri* and *Cyranus ussuriensis*. The fourth and the last two are not mentioned in the latest text-books, while *S. hemisphaerula* mentioned in the latter is not given in the author's list. H. H. S.

BRUMPT (E.) VELASQUEZ (J.) UCROZ (H.) & BRUMPT (L. Ch.). Découverte de l'hôte intermédiaire *Limacina bogotensis* Pilsbry de la grande douve *Fasciola hepatica* en Colombie. [*L. bogotensis* as Intermediate Host of *F. hepatica* in Colombia].—Ann Parasit. Humaine et Comparée. 1939-1940. Vol. 17 No. 6 pp 583-594 With 1 fig & 1 plate 59 refs.

LIMACINA bogotensis has to be added to the 15 snail hosts already known in nature and to the 5 that have been infected experimentally. This new host has been implicated in the savanna of Bogotá in Colombia at a height of 2,600 metres to the extent of 2 among 122 dissected. C. L.

YAWS AND SYPHILIS.

PRICES OF ABSTRACTS IN THIS SECTION

PARDO-CASTELLO (p. 49) shows that in Cuba yaws is relatively more common in the negroes than in the whites, and that it is largely found in rural family groups. Clinically there are found ulcerative

primary lesions (suggesting bacterial infection) gangosa persistent early lesions and bone changes but the author does not mention juxta articular nodules or goundou. The clinical picture in the early stages of yaws but not in the late stages in no way resembles that of syphilis

TAKAHASHI and ASAI (p 50) give an account of yaws in the natives of Formosa describing the lesions commonly found. With CHIN (p 51) they show that relapse occurred in a number of patients with florid yaws in spite of full salvarsan treatment. In many the Wassermann reaction remained positive and there was no relationship between the intensity of treatment and the development of the reaction.

HERMANS (p 52) describes the forms taken by plantar and palmar yaws. SOETOPO and GOENAWAN (p 52) discuss leprosy like infiltrations occurring in yaws. OOMEN (p 52) discusses the nasal lesion of tertiary yaws. They are most common in young adults and a very full description which cannot be further abstracted is given. So long as the inflammatory process is active it is susceptible to treatment with salvarsan preparations and the author emphasizes that this treatment should be given and that even a few injections may suffice to check the spread and prevent serious results. SINADURAI (p 53) reports gangosa in a native of Malaya who denies having had secondary yaws and who has no sign of leprosy tuberculosis blastomycosis dermal leishmaniasis or late syphilis. The Wassermann reaction is not recorded. Although gangosa is always found in areas where yaws is endemic some other factor may be concerned in the aetiology. D'IGNAZIO and DEL CAMPO (p 54) describe the course of a case of gangosa.

NAVARRO and GOMEZ (p 54) describe in detail a simple serological test for yaws and syphilis the results of which agree closely with those of the Kahn and Wassermann tests. The procedure cannot be further abstracted. FOLEY (p 56) reports positive Wassermann reactions in a considerable proportion of a group of native inmates of a mental hospital in Tanganyika Territory.

HOFF and SHABY (p 56) describe three cases in Bedouin Arabs in which a diagnosis of syphilis of the central nervous system was made. They state that many cases of meningovascular syphilis are seen in the Bedouin Arabs and argue that if the type of syphilis from which they suffer is that known as bejel then this form can give rise to manifestations of meningovascular involvement.

MONACELLI and PISANI (p 57) describe the cases of three brothers all children in whom signs of amyotrophic lateral sclerosis were associated with juxta-articular nodules. It is concluded that both the nervous lesions and the nodules were manifestations of hereditary syphilis.

C IV

PARDO-CASTELLO (V) Yaws Five Hundred Cases observed in Cuba —
Arch Dermat & Syph 1939 Nov Vol 40 No 5 pp 762-773 With 7 figs

Though yaws has been recognized as occurring in all the islands of the Caribbean Sea Cuba until a few years ago was generally supposed to be free. In 1932 the author reported for the first time the occurrence of yaws in three white children of well-to-do parents in the province of Oriente.

In 1937 a Commission of Enquiry into yaws was appointed. Cuba has an area of 12½ thousand square miles with a population of 651 035 whites and 481,350 negroes. The Commission found evidence that the disease had existed in the island for at least 40 years. It was thought that the affection had been introduced by labourers from Haiti and Jamaica. The greater proportion of the cases were found in Oriente and totalled 227 whites 274 negroes—in a population which was about 40 per cent negro. These cases were to a very large extent distributed in the rural population which lives in small isolated family groups in the mountainous regions, a fact which is taken to account for the non-spread of the disease.

The clinical descriptions resemble those of the disease anywhere else and need little comment. The author refers to ulcerative primary lesions as well as granulomatous, suggesting that secondary bacterial infection is common. He mentions as seen (but no figures given) lesions of the septum nasi, tonsil, "soft and hard palate and of the pharynx following a rapid and destructive course going on to gangosa (i.e. lesions associated with gangosa rather than secondary lesions of mucosa membranes). He observed the well-known phenomenon of early lesions persisting for years and undergoing changes with mutation to a tertiary type of lesion. Bone lesions including salivary glands are common, but there is no mention of J.A.N. nor of gonorrhoea. No cases of nervous disease and no case of aortitis due to yaws are noted. In 25 cases (stage of disease which is important not mentioned) the C.S.F. was examined in 13 there was an excessive value for globulin in 3 pleocytosis with a maximum of 11 lymphocytes. In 6 the Kahn test was positive in 13 the Lange gold curve was a syphilitic curve (results much resembling those of other observers).

The author agrees with other framboesologists in stating that while late ulcerative (gummatous) lesions cannot be differentiated from those due to syphilis the clinical picture in the earlier case of yaws in no way resembles the latter disease.

It would be very interesting to know more definitely the history of yaws in Cuba. As the facts stand it would seem possible that the disease was of ancient standing and that what is seen now is all that remains.

H. S. STANLEY

TAKAHASHI (Shunkichi) & ASAI (Tōru) Leber *Framboesia tropica* in
Formosa. *Vierteljahrsschrift Naturforschenden Gesellschaft in Formosa*.—*Acta*
Japonica Med Trop Formosa 1939 May Vol 1 No. 1
PP 57-77 With 17 figs 10 refs

That yaws is endemic in the southern part of Formosa has been known for many years but it has only on two occasions been the subject of any communications. The authors have therefore set out their findings concerning this disease as observed in the three southern provinces of that island in considerable detail, with a number of excellent photographs of a number of the conditions they describe. The total number of cases studied was ninety-seven. Tables showing sex and age incidence stage of disease distribution of initial lesion and other types of lesion are given as also some tables referring to treatment.

Speaking generally the picture of yaws here presented differs in no way from that in any other endemic area.

The following points may be noted the disease occurs among the primitive poorly nourished Palwan peoples living at anything up to 1 000 feet above sea level an indigenous folk also subject to endemic goitre Males are more frequently affected than females in a proportion of 5 3 Sexual intercourse seldom if ever plays a part The primary lesion tends most frequently to be on the leg The hairy scalp is never involved. There is no loss of hair A spoon-shaped deformity of the nails was not uncommon among the patients Various lesions of mucous membranes are mentioned such as leucoplakia of tongue oedema of tonsil and linear lesions on the gums but these were the authors believe due to over indulgence in tobacco these lesions were spirochaete negative in contradistinction to those about the lips which were positive.

Keratitis conjunctivitis and iritis were also noted in a few cases but there was no evidence that these were framboesial in nature There was no evidence of involvement of the central nervous system The femoral glands were commonly enlarged but no generalized adenopathy was noted. In three children bowing of the tibia was observed but no cases of joint affection nor of gangosa were seen Juxta articular nodules are not mentioned H S S

TAKAHASHI (Shunkichi) ASAI (Toru) & CHIN (Toku) Ueber Framboesia tropica in Formosa I Mitteilung Ueber serologische Studien bei Framboetikern aus Rikiriki und den benachbarten Eingeborenkolonien [Yaws in Formosa, Serological Studies in Rikiriki and Adjacent Native Colonies.]—*Taiwan Igakkai Zasshi* (Jl Med Assoc Formosa) 1940 Mar Vol 39 No 3 [In Japanese pp 315-341 [29 refs.] German summary pp 342-350]

Reference is made to the work abstracted above in which 97 cases were reported during 1938 In 1939 there were found 125 further cases of which 64 were of florid yaws In a number of these there was definite relapse in spite of full salvarsan treatment The previous medical histories of 86 were followed up and many during the last 10 years had undergone specific therapy sometimes to the extent of five courses of treatment Most had been intensively treated in the autumn of 1938 or the spring of 1939 yet in the summer of 1939 relapse was seen in 21

It is commonly known that although the eruption of yaws is usually cleared by a single injection of a salvarsan preparation it is difficult to convert a positive to a negative Wassermann reaction In the summer of 1939 the Wassermann reactions of 94 patients were — strongly positive 43 (of whom 20 had florid yaws) positive 19 (4 florid) weakly positive 10 negative 22. There was no relationship between the intensity of treatment and the development of the Wassermann reaction and it is not understood why so many remained positive after full treatment and why so many should undergo relapse Further work on these points is necessary The relapses took the form of clavus psoriasis condyloma and papilloma Tables are given which show the distribution of these according to the results of the Wassermann reaction C W

SINHA (G N) Yaws in Chitra Subdivision of Hazaribagh District, Chota nagpur—*Indian Med Gaz* 1939 Dec. Vol. 74 No 12. pp 728-729

HERMANS (E. H.) Plan de la plante du pied et de la paume de la main. (Plantar and Palmar Yaws.)—*Acta Leidensia* (Scholae Med Tropicae) 1939 Vol 14 pp 111-118. With 10 figs. on 4 plates.

Professor Hermans the author of a work on *framboesia tropica* in 1928, now returns to the question of yaws affections of the palm of the hand and sole of the foot.

He distinguishes (1) a maculo-papular erythema (2) papillomata (3) psoriasisform lesions (4) keratosis (5) keratoma sulcatum of the sole and (6) keratoderma punctatum.

Erythematous macules may appear early or less often a papula; eruption is seen which the author previously included as a psoriasisform type. The papules may not develop further or they may be transformed into ordinary yaws some may become vesicular. The papillomatous lesion is an ordinary yaws which on the foot owing to the thickening of the skin gives rise to the crab-yaws. Mention is made of a psoriasisform condition of the palms in a white missionary who had previously contracted yaws. Reference is made to the framboesia keratosis as abnormal lesions. Their association with a spotty depigmentation is noted. Keratoma sulcatum and keratoderma punctatum are also briefly referred to. [The conditions to which reference is made were all described long ago and are all well known to those familiar with yaws. There is nothing new in this article.] H S S

SOETOPRO (M.) & GOENAWAN (R.) Leprosie uitlagen bij framboesia (Leprosy-like Eruptions in Yaws.)—*Geneesk Tijdschr v Nederl Indie* 1939 Oct 17 Vol 79 No 42 pp 2839-2850. With 6 figs on 2 plates. English summary.

1. Description of three patients, who in the course of yaws showed leprosy infiltrations.
2. Physical examination the histological picture of the skin lesion and the serological tests confirm the clinical suspicion (i.e. the condition was due to yaws).
3. It is possible that under certain circumstances yaws induces leprosy infiltrations.
4. The affection has been differentiated from syphilis, leprosy, tuberculosis and deep mycotic diseases.
5. In the tropics leprosy is to be considered first in such cases.
6. It is often impossible to distinguish syphilis from yaws.
7. In cases suspected of mixed infection with tuberculosis, the diagnosis depends on histological examination and cavie (guinea pig) test.

DOOVEN (H. A. P. C.) Over framboetische afwijkingen van de neusholten 1. Symptomatalogie (Yaws Lesions of the Nasal Cavities.)—*Geneesk Tijdschr v Nederl Indie* 1940 Jan 1 Vol 80 No 2 pp 84-108. With 9 figs. on 9 plates. English summary.

1. Framboesia of the nasal cavities is a commonly observed condition in the tertiary stage of yaws. It is not infrequently met with even in older children. In persons above fifty years of age usually no more than del are to be found but fresh inflammations are then not so very exceptional. Even without treatment the disease can come to a standstill during youth of the victim.

2 If the nasal process has once set in it almost invariably leads to serious deformity. Breathing through the nose, swallowing and voice formation are hampered and the face suffers gross lesions. The sense of smell usually remains intact and the general health of the sufferer is strikingly little affected by the nasal process itself.

3 Although there are often typical scars to be seen in the neighbourhood of the nose and the organs of audition and tear forming apparatus are often subjected to secondary changes, the mutilating lesions form a definitely self-contained syndrome which in about 80 per cent. of the cases remains limited to the walls of the nasal and the naso-pharyngeal cavities.

4 The affection appears usually bilaterally, but is seldom symmetrically distributed. Equally seldom does it remain limited to a small area in the nose, so that as a rule several foci are found at the same time or following one another.

5 The active lesions present the characteristics of very chronic inflammatory processes. Their aspect is variable. Multiple ulcers and ulcerations are found on the turbinates and lesions rapidly leading to perforation on the cartilaginous septum. These are accompanied by a more or less foetid rhinorrhoea and small haemorrhages and by the ejection of small sequestra of bone. On the bottom of the nasal cavity, in the nasopharynx and along the free margin of the soft palate appear more long drawn out infiltrates with small or larger erosions. Circinate superficial dry ulcers are also found on the soft palate and on the posterior wall of the naso- and oropharynx.

Sporadically the gums of the intermaxillary area are involved in the inflammation. Externally the wings and point of the nose often have a typical purple red colour, are grossly swollen, desquamating and eroded.

A strictly localized beginning of the process is only occasionally observed in the form of a granuloma on the turbinates. It appears that any of the above-mentioned inflammatory affections may start the process off.

6 These inflammatory processes lead in the course of months or years to striking deformities and defects, mostly of the soft tissues but also of the cartilage and bone. There arises coarsely meshed firm scar tissue which is subject to powerful retraction. Even when there is no deformity visible externally on the nose there may be extensive lesions around the nasal cavities. Large perforations of the anterior septum, obliteration of the inferior turbinates, defects in the hard palate and defects and scars in the nasopharynx are the commonest manifestations.

7 As long as the inflammatory process shows any signs of activity it is susceptible to treatment with salvarsan preparations. In general, it is very little resistant to even a few injections. Since we can never know how serious deformities may be caused by any given process, it is just as grave an error of technique to withhold the administration of salvarsan as it would be to leave a broken bone to its own devices.

8 The Wassermann reaction was positive (and usually strongly so) in all patients suffering from an active inflammatory process as were also the clearing and clouding reactions of Meinicke. It would appear that in cases where the process has burned itself out these serum reactions can occasionally become negative.

SINNADURAI (Chellappah) A Curious Case of Gangosa — *Jl Malaya Branch Brit Med Assoc* 1940 Mar Vol 3 No 4 pp 419-421
With 2 figs

Gangosa is now rarely seen owing to the therapeutic advances of the last 30 years. The patient here described is a man of about 32 living on the island of Langkawi. He was normal up to the age of 12, when he developed a lesion inside the nose which gave rise to a foul discharging indolent ulcer which slowly extended in all directions.

During eight years the process spread, resulting in the present condition in which there is an irregular facial pit bounded below by the dorsum of the tongue above by the remnants of the ethmoid, and on both sides by the exposed maxillary sinuses and the posterior fragments of the upper jaw. The soft palate uvula and fauces are intact but the whole of the nose and the front portion of the maxilla have gone. Swallowing is somewhat difficult but there is no regurgitation of food. Phonation is not quite clear but he can enjoy a cigarette.

The patient absolutely denies having had secondary yaws and received only herbal treatment for the gangosa. He is free from leprosy tuberculosis blastomycosis, dermal leishmaniasis and the late signs of syphilis. No record of the Wassermann reaction is given. While acknowledging that gangosa is always found in areas where yaws is endemic, the author quotes Stursov in the Cameroons who suspects that some other factor plays a part in the aetiology of the condition. It is possible, however that this patient has had yaws but that the granulomata were so few as to pass unnoticed [see also this *Bulletin* 1940 Vol. 37 p. 21] C. H.

D'IGNAZIO (Camillo) & DEL CAMPO (Giovanni) Contributo alla etiopatogenesi della gangosa. [On the Pathogeny of Gangosa.]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939 Dec. Vol. 20 No. 12, pp. 663-672. With 5 figs.

The authors describe, with much detail, the case of a woman of 24 years who had been married at the age of 13 and separated from her husband a year later. At the age of 15 she suffered from a nodular pruriginous eruption of one penna which ulcerated and during the next two years extended to the eye. After suffering from this for five years she had it treated by canter and it healed. About one year ago that is three years later she developed an itching nodule at the base of the nasal septum which soon ulcerated and spread to the upper lip and also deeply towards the soft palate and pharynx—a typical gangosa. Organisms present were *Sp. refringens* *B. fastiformis* and a spirochaete like *S. pallida*. The Wassermann reaction was strongly positive with serum negative with spinal fluid. The authors discuss the diagnosis of blastomycosis, leishmaniasis and gangosa and conclude that the last was the correct one in this case. H. H. S.

HOFFMANN (Ernst) Gemeinsame amerikanische Herkunft der tropischen Framboesie und Syphilis auf Grund neuer Forschungsergebnisse und Knochenfunde. [The Bearing of Recent Research and Bone Findings on the Common Origin of Yaws and Syphilis from America.]—*Munch. Med. Woch.* 1939 Oct. 13 Vol. 86 No. 41 pp. 1512-1515 [Refs. in footnotes]

NAVARRO (R. J.) & GOMFZ (F.) A Simple Serologic Test for Yaws and Syphilis suitable for Provincial Hospitals and Field Dispensaries. A Comparison with the Kahn and Wassermann Tests in over 5,000 Cases.—*Philippine Islands Med. Assoc.* 1939 Oct. Vol. 19 No. 10 pp. 607-610. [Summary appears also in *Bulletin of Hygiene*]

The authors detail a serological test for syphilis and yaws first described by CASILLI in 1936 [see *Bulletin of Hygiene* 1937 Vol. 12]

p 39] They have carried out tests on 5,390 samples controlled by Kahn and Wassermann reactions. With the first there was a 1.63 per cent disagreement with the Wassermann reaction a 4.34 per cent disagreement. The test as described is as follows —

The ordinary Kahn antigen and ordinary normal salt solution are the only reagents needed. The titer of the Kahn antigen must be known just as in the use of the antigen in the Kahn test. One cubic centimeter of antigen mixed with its corresponding amount of salt solution is usually sufficient for ten to fifteen tests.

"The amounts of antigen and salt solution needed for the test are placed separately in small tubes. They are then mixed just as in the Kahn test, and the mixture is poured back and forth six to eight times. The mixture is allowed to stand for ten minutes before it is centrifuged at a speed of around 1500 revolutions per minute for another period of ten minutes. The clear supernatant fluid is carefully decanted leaving a thick yellowish white mush at the bottom of the tube. The inner wall of the tube is dried by inserting cotton or filter paper into the tube down to but not touching the mush. This prevents the mush from becoming watery and preserves its thick mushy consistency. An ordinary slide may be divided into two equal areas by a perpendicular glass pencil mark running across the middle of the slide. The left hand area is marked (C++) at the upper portion and the right hand area is marked (C-) This slide is for control sera both positive and negative. Two or three drops of a known positive serum that has been inactivated at 56°C for 30 minutes are placed on the left half of the slide and an equal number of drops of a known negative serum are placed on the right half of the slide. A small amount of mush, an amount carried by a two millimetre area of the flat tip of an ordinary Ideal toothpick, is mixed with the positive serum and thoroughly emulsified in the serum with the aid of the same toothpick. A similar amount is mixed with and emulsified in the negative serum using another toothpick. Irregular clumps or aggregates are formed in the positive serum in three to five minutes while the negative serum mixture remains homogeneous. Similar preparations for unknown sera are then made, placing two sera on a slide one in each area. Sera to be tested must be cleared by centrifuging and inactivated at 56°C for 30 minutes. Slight or even moderate hemolysis does not interfere with the test. Strongly positive sera will show changes immediately with large clumps or large aggregates forming even while the mush is being emulsified. Weaker sera will show a delay in the formation of the clumps or aggregates and these are usually smaller or finer. Very weakly positive sera will show the change only after a certain time has elapsed (5-7 minutes) and the clumps may be very fine. In the latter reactions a concave mirror similar to that of the microscope mirror is very helpful in determining the presence of aggregate or clump formations. It is thus seen that the reaction is semi-quantitative its strength being determined not only by the size of the aggregates but also by the time of their appearance. It is a wise policy to recheck the results after 10 minutes as weakly positive sera may show clumps only after this time has elapsed. Usually clumps or aggregates developing after this period are small and very fine occasionally however coarse aggregates or big clumps develop as late as 10 minutes. Retaining the old designation of four plus three plus two plus and one plus for positives it is recommended that sera showing big clumps or aggregates immediately after emulsification be designated four plus those showing a delayed formation of clumps even if large ones or those with smaller clumps developing immediately may be designated three plus small clumps with delayed formation may be designated two plus and those very fine clumps developing very late may be called one plus. Suspicious aggregates may be designated (±) and those remaining homogeneous after 20 minutes, may be called negative.

H S S

FOLEY (E. J.) *Syphilitic Infection of the Central Nervous System in Patients of the Dodoma Mental Hospital (Tanganyika)*—*East African Med J* 1940 May Vol. 17 No. 2, p. 81

Of 68 cerebrospinal fluids taken as a routine from these patients [the majority of whom were presumably African natives] 23 gave positive Wassermann reactions. Almost all patients with strong reactions showed increase in protein, wasting, tongue tremors and dementia. Two showed considerable improvement after receiving trypanamide. The knee and ankle jerks of some patients were sluggish or absent and pupillary changes were observed. C IV

HOUF (Hans) & SHABY (J. A.) *Nervous Manifestations of Bejel*.—*Trans Roy Soc Trop Med & Hyg* 1940 Mar 20 Vol. 33 No. 5 pp. 549-551 [Summary appears also in *Bulletin of Hygiene*]

There is a general consensus among writers on Bejel that nervous manifestations are rare, but the authors maintain that this is erroneous if it is conceded that bejel is endemic syphilis not linked with sex. They describe three cases of different interest among Bedouin Arabs giving a history of bejel.

The first is that of a man of 50 years who had suffered for 6 months from headache, giddiness, vomiting and falling on attempting to walk. There was paralysis of the right side of the face peripheral in type and loss of the right corneal reflex, also right-sided tremor and ataxia. The Wassermann reaction was positive both with serum and spinal fluid. A diagnosis of *gumma* of the right cerebello-pontine angle was made.

The second was a woman of 23 years with a history of progressive weakness in arms and legs and difficulty in speaking and swallowing. There was symmetrical atrophy of the tongue muscles, speech nasal and bulbar paralysis of the soft palate and regurgitation of food through the nose. There was spastic paraplegia with increased reflexes and an extensor plantar response, but no sensory disturbance. W R positive with serum, negative with spinal fluid. A diagnosis was made of *gumma* of the pons.

The third was a girl of 18 years complaining of sudden loss of power in the legs. There was complete flaccid paraplegia, but no disturbance of sensation or involvement of cranial nerves. After 8 days the flaccidity gave place to spasticity and exaggerated reflexes and slight dulling of sensation up to the level of distribution of the 10th dorsal. W R positive with serum, negative with c.s.f. All three patients made a good recovery on being given anti-syphilitic treatment. The authors conclude—

We see many cases of meningovascular syphilis among Bedouin Arabs, and if we are to call their type of syphilitic infection bejel, then we must state that manifestations of meningovascular involvement due to this form of syphilis are quite common.

[See also this *Bulletin* 1935 Vol. 32, p. 891. 1936 Vol. 33, p. 966. 1937 Vol. 34, p. 865 and *Bull of Hyg* 1929 Vol. 4, p. 232. 1930 Vol. 8, p. 417. 1936 Vol. 11, p. 908. 1937 Vol. 12, pp. 117, 773. 1939 Vol. 13, p. 294. 1939 Vol. 14, pp. 222, 407.] H. H. S.

MONACELLI (Mario) & PISANI (Domenico) Pseudosclerosis laterale amiotrofica familiare associata a nodosità juxta articolare [Symptoms of Amyotrophic Lateral Sclerosis Associated with Juxta-Articular Nodules]—*Settimana Med* Palermo (formerly *Riv Sanitaria Siciliana*) 1940 Feb 16 Vol 28 No 7 pp 161-2 165-8 171-4 177-8. With 5 figs. on 2 plates.

After alluding to the association of certain skin lesions with various neuropsychopathies commonly of hereditary and familial type Professors Monacelli and Pisani of the University of Messina describe in detail the cases of three brothers, aged 13 and 9 years and 22 months respectively each of whom presented the picture of amyotrophic lateral sclerosis associated with juxta-articular nodules. They were the first third and sixth born in a family of six children of whom the second died at the age of nine months from nephritis the fourth and fifth were healthy.

In case (a) the first nodule was noticed on the hand at the age of four years soon after an attack of nephritis and shortly before the onset of muscular wasting. Nodes appeared in the neighbourhood of the left wrist on the dorsal aspect of the proximal and distal interphalangeal joints of the little finger of each hand at the line of the tibio-tarsal joint the metatarso-phalangeal joint of the big toe etc.

In case (b) there was a history of nephritis at the age of five years followed soon after by wasting of muscles and the appearance of nodules on the feet. When the child came under observation nodes were present in the neighbourhood of the olecranon process of each arm the metacarpo-phalangeal joints of the second and third fingers the interphalangeal joints of the second third and fourth fingers the external malleoli and the tarso-metatarsal joints of the right first toe and left second toe.

In the third case (c) the twenty two months old child the first nodules appeared at eight months followed in a few months by the symptoms of the nervous disease the neighbourhood of the interphalangeal joints of both upper and lower extremities being again the site of the swellings.

All the nodules were rounded in contour about the size of a small nut firm in consistency and partly movable. They are well shown in the published photographs. The differential diagnosis of subcutaneous nodules is then discussed at some length and the authors reach the conclusion that the nodes in their three cases show all the characters of juxta-articular nodules (Jeanselme and Lutz) further borne out by the histological findings on biopsy. The literature upon cases of non framboesial J.A.N. is next reviewed and the evidence for believing their own cases to have a syphilitic aetiology is discussed. Patient (a) showed a positive Meinkke reaction and had suffered from a nephritis of unspecified nature. patient (b) also had nephritis but was serologically negative. in case (c) there was no history of nephritis and the serum reactions were negative. One of the children manifested a sclerohypertrophic glossitis commonly recognized as a sign of hereditary syphilis.

The father aged 36 denied syphilis and other venereal disease the mother aged 33 manifested no clinical signs of the disease and there was no history of miscarriages but she showed a weakly positive W.R. on reactivation.

Senegal, which had produced the most a year before. This may be the result of intensive vaccination against the disease. The first positive specimen from Tchad is reported.

SOREL (p. 88) records a case of rural yellow fever in a European in Eastern Oubangui. [It is not clear and perhaps could not be made clear whether this was a case of yellow fever transmitted by *Aedes aegypti* or by other mosquitoes, but no connexion with any other case could be found. It will be remembered that SOREL distinguishes between rural yellow fever transmitted in country districts by *Aedes aegypti* and jungle yellow fever transmitted in the absence of that mosquito. In the jungle variety man is not usually an important reservoir of the virus, but monkeys may be. See this *Bulletin* 1939 Vol. 36 p. 633.] In Malakal, the Commission on Yellow Fever (p. 89) reports that the proportion of natives whose blood gave positive protection tests has risen from 0 to 18 per cent. in 4 years (Atkey) yet in this period there has not been a single clinical case of yellow fever and *Aedes aegypti* is practically non-existent. [This again suggests that the jungle form occurs.]

As an explanation of this phenomenon ATKIN (p. 854) suggests that the virus becomes attenuated in passing from West to East Africa, as a result of local conditions, and may ultimately cease to produce typical symptoms.

DE LOTTO (p. 552) describes a condition seen in Western Abyssinia, which has certain resemblances to yellow fever but further investigation is necessary before its nature can be determined.

STREATH (p. 80) discusses yellow fever in British Guiana. On the coast protection tests are negative in children under 15 and are not frequently positive in older persons. In the interior however 118 of 248 males and 8 of 43 females were positive, a disparity which suggests that it is the jungle variety which is concerned, especially as *Aedes aegypti* is not found in one district in which tests were positive. Special measures are necessary to prevent the introduction of the jungle virus into the vulnerable coastal belt where conditions would favour its spread. JAMES (p. 88) shows that in S. America urban yellow fever is not increasing, but jungle yellow fever remains a serious problem.

Actiology and Transmission

VAN DEN BERGHE (p. 94) found that a neurotropic virus of the French strain, when injected intracerebrally into a baboon, gave rise to virus in the brain which gave the usual neurotropic reaction on intracerebral inoculation in mice and also to virus in the liver which on subcutaneous inoculation into rhesus monkeys and subsequent reinoculation intracerebrally into mice gave rise to typical viscerotropic reactions. It seems therefore, that the virus is dissociated in the baboon, being strongly neurotropic in the brain and viscerotropic in the liver.

SALEUX (p. 550) reports that the neurotropic Dakar strain has been maintained in the laboratory for 4 years without undergoing any modification.

PENXA and MOUSSATCHÉ (p. 558) show that passage of a fully virulent virus of the Anaba strain in fowl embryos from which the nervous tissues had not been removed resulted in great reduction of neurotropic properties by the 49th passage. This is a much quicker modification than was found in the case of virus 17 D which was fully

neurotropic after 89 passages even though the nervous system had been removed from the embryos used for culture.

FINDLAY and MACCALLUM (p 83) have demonstrated the power of the yellow fever virus to infect *rhesus* and other monkeys when administered by means of a catheter passed into the stomach. Pantropic and neurotropic strains were used and also the tissue culture virus 17 D. All the monkeys used became infected some dying and others showing immunity. The experiment failed with other animals and with 6 human volunteers and this may be correlated with the rapid destruction of the virus by the acid gastric juice which is known to occur *in vitro*. PELTIER *et al* (p 92) have shown that the neurotropic French strain of yellow fever virus passes to the blood of monkeys and man when applied to the scarified skin. They have therefore used this method in the vaccination of a number of men [see below vaccination]

FINDLAY and MACCALLUM (p 83) point out that 37 cases of yellow fever have been reported in laboratory workers in close contact with infective material [and presumably without the intervention of any vector]. They further report that two of their monkeys kept in separate animal houses died from spontaneous yellow fever. In these rooms there had not been any infected animal during the preceding 3 and 6 months respectively and no virulent pantropic virus was in the laboratory during the period. The method of infection is not known. Mosquitoes were entirely absent but monkey lice rat fleas the cockroach *Blattella germanica* and a small ant were present. The possibility that one or more of these arthropods was responsible is under consideration. [It is shown above that monkeys may be infected *per os* and the same authors have proved that the virus can exist with full activity for 15 days in *B. germanica*. The possibility of infection through scarified skin is discussed by PELTIER *et al* above and through the intact skin by ARAGÃO below]

ARAGÃO (p 556) advances the theory that the transmission of jungle yellow fever which is commonly acquired during the daytime depends mainly on the human skin coming into contact with infected mosquito faeces deposited on plants in the woods where the insects shelter. Jungle and other mosquitoes which bite during the day are said to be always young insects which have not yet sucked blood and which cannot therefore be infected with yellow fever. It is thought that jungle yellow fever must have originated from the adaptation of the urban virus to jungle mosquitoes in comparatively recent times. The jungle mosquitoes are adapted to lower temperatures than *Aedes aegypti* and can transmit the disease at 20°C. whereas *Aedes aegypti* requires 25°C. The development of the virus depends more however on adaptation to the insect host than on the thermal level. In the opinion of HOFFMANN (p 556) on the other hand jungle yellow fever is the disease in its primal natural state in which it maintains itself in local mammalia.

O'BRIEN (p 552) has given details of the larval index for different localities in the Gold Coast for 1938.

ATKEY (p 552) found 125 specimens of *Aedes aegypti* in over 5 million collections of mosquito larvae in the Sudan. In a survey of Mombasa chiefly concerned with malaria, WISEMAN *et al* (p 786) found that the commonest mosquito was *Aedes aegypti* and that several other mosquitoes known to be capable of transmitting yellow fever were present. Monkeys which might act as reservoirs of infection

are found and the authors point out that, should yellow fever be introduced, this area would almost certainly become an endemic centre. KENNEDY (p. 553) has investigated the visual responses of flying *Aedes aegypti*. There is an attraction to moving objects and especially to dark moving objects, but the inability of the mosquito to fly except in gentle winds may be an important factor in confining this species to sheltered places.

WHITFIELD (p. 554) has discussed the importance of air transport in relation to malaria and yellow fever.

Pathology

SICK and RODALLEC (p. 551) examined the foetuses of two women who died of yellow fever neither having aborted. The majority of the foetal organs showed changes resembling those in the mothers and in the foetal livers were found fatty degeneration, dilatation of the sinusoids and much pigment but no cellular necrobiosis.

In discussing the possibility that the pathological appearances in poisoning by carbon tetrachloride may resemble those seen in yellow fever BABLER (p. 88) considers that this is unlikely in previously healthy subjects but points out that in the colonies natives are rarely free from other infection and that diseased organs cannot withstand the action of toxic agents so well as healthy and may develop lesions resembling those of yellow fever except that pyknotic nuclei are present. The most difficult cases to diagnose are those with recent cellular lesions superimposed on chronic hepatitis.

Control

In the Gold Coast, MACKAY (p. 549) reports that the preventive measures, which are confined to the larger centres and ports, comprise careful mosquito control, with particular attention to trees in the rot holes of which *Aedes* breeds. Residential areas still provide the most important safeguard for Europeans, but the number of Africans living in these areas has increased recently.

POWERS and HEADLEE (p. 84) have experimented with oils to test their effect on the eggs of *Aedes aegypti*. The lethal action appears to depend on the establishing of a coat of oil on the chorion, which leads to oxygen starvation and death. The more complete the coat the more rapidly is death produced. Twenty-eight oils were tested the most efficient were those with viscosity of 108 of which the one known as "Zerco 40" manufactured by the Standard Oil Company of New Jersey was the best.

ATKIN (p. 554) gives details of the regulations enforced in the Sudan to prevent the spread of yellow fever by aircraft. In infected zones passengers are only allowed to embark at anti-amaryl aerodromes, must remain for 8 days under observation in the aerodrome before embarking, and must carry a certificate. Night stops are forbidden except at anti-amaryl aerodromes and passengers and crew must remain at the aerodrome in places free from mosquitoes. Intensive anti-*Aedes* measures are undertaken in suspected regions. Anti-amaryl aerodromes must be at least 1 kilometre from human habitation. If these means there is no risk of infected *Aedes* being carried in aircraft and the only possibility of spread is by infected persons during the incubation period. This risk would be reduced by a system of certificates for passengers and crews.

[It may here be noted that Rule 9 of the Indian Aircraft (Public Health) Rules 1940 has been amended the relevant part now reads as follows —

Special provisions relating to yellow fever

9 An aircraft shall be regarded as infected with yellow fever—

(iv) if there is on board any person who within nine days of arrival in India has been in a yellow fever infected area

Provided that an aircraft shall not be regarded as infected under clause (iv)—

(a) if the person referred to has only alighted in a yellow fever infected area at a non infected anti-amaryl aerodrome and is in possession of a certificate from the Health Officer of that aerodrome stating that during his stay he either remained within the anti-amaryl aerodrome or if he went outside it he did so under such protected conditions as would make it impossible for him to be bitten by mosquitoes or

(b) if the said person has been protected against the disease by a previous attack or by satisfactory inoculation performed not less than 21 days and not more than two years before his arrival in the yellow fever infected area

(Clause (b) originally read —

(b) if the said person has been protected against the disease by satisfactory inoculation within the preceding two years or by a previous attack of the disease.))

Vaccination

MACKAY (p 549) advises that all Europeans should be vaccinated before proceeding to the Gold Coast, since most people must travel and the quarantine measures during an outbreak profoundly complicate travelling and trade

The Yellow Fever Commission (p 88) confirm the value of vaccination in general and recommend the use of virus vaccine 17 D With this vaccine the amount of virus circulating in the blood is too small to infect mosquitoes fed on the vaccinated subjects. JAMES (p 88) states that for jungle yellow fever the only practical method of protection appears to be vaccination, and that during 1938 over one million persons were vaccinated with the tissue culture virus 17 D In London 7 000 have now been vaccinated before going abroad some with 17 D and no cases of delayed jaundice have been seen with the latter Antibodies may persist for as much as 7 years but usually disappear within 2 years. Revaccination has been performed without reaction. As time goes on it is becoming increasingly evident that vaccination affords a sure method of protection

BRIERCLIFFE (p 558) reports what must be an exceptional case that of a woman who contracted yellow fever 4 months after vaccination. She recovered but the protection afforded can only have been slight. Such cases have occurred but rarely in Brazil.

VOGEL and RIOU (p 91) write of the value of phosphate vaccine (of which 3 injections are given) and of egg-coated vaccine (of which a single injection is given) With the former immunity develops between the second and third inoculation in 85 to 90 per cent. and in 75 per cent. this persists from one to two years. In over 10 000 persons vaccinated only one case of yellow fever developed in French colonies whereas there were 109 cases in unvaccinated persons.

ALFORD (p. 550) shows that the sera of certain Europeans in French Equatorial Africa, vaccinated with egg coated vaccine gave little or no protection after 3 months, and concludes that the vaccine, received from Paris, had deteriorated during transport. Vaccine should therefore be prepared on the spot in the case of any serious outbreak.

JADIN and ARNALDI (p. 557) state that in the Congo Europeans show more reactions after vaccination than do the natives and that there is a liability in Europeans to meningo-encephalitic reactions. Vaccination (which was with Laligret's egg-coated vaccine) should only be resorted to in Europeans in case of danger such as the outbreak of an epidemic.

PELLETIER *et al* (p. 62) having shown that neurotropic virus can pass through scarified skin, vaccinated a number of people with a mixture of neurotropic yellow fever virus and smallpox vaccine, with considerable success as far as yellow fever was concerned. The application of this method to large numbers of natives in Africa is being authorized. The same authors (p. 557) contribute further information on simultaneous vaccination against smallpox and yellow fever by the scarification method. In 98,873 vaccinations there were no serious after-effects, even in infants, and there were no cases of yellow fever due to transmission of the vaccine virus by *Aedes aegypti*. Protection against smallpox was equal to that produced by the ordinary method, and protection against yellow fever was given in 85.6 per cent of a large number of persons examined. The method is innocuous and rapid and appears to offer great possibilities for the protection of the general native population.

PEROTA (p. 558) reports a new technique for the aseptic removal of fowl embryo from the egg which eliminates the necessity for filtering the suspension of embryo in the preparation of vaccine.

Charles Wilcocks.

YELLOW FEVER

PRELIMS OF ABSTRACTS IN THIS SECTION

CASSTON (p. 65) shows that in Senegal during the last 150 years, epidemics of yellow fever have been followed by silent intervals of 7 to 37 years.

SMITH (p. 66) has found yellow fever immune bodies in the sera of 32 per cent of sheep in Kano N. Nigeria. Intracerebral inoculation of yellow fever virus into sheep causes the production of immune bodies and appears to retard the action of the virus when this is inoculated into mice. The virus survives for at least 13 days in the sheep's brain. The immune bodies found in sheep in Kenya and Nigeria are probably the result of acquired immunity but the possibility of diseases other than yellow fever producing them has not yet been definitely excluded.

SICK and BROCHEM (p. 66) record isolated cases of yellow fever in the jungle country of the French Sudan and consider that animal reservoirs may exist.

DA FONSECA (p. 66) in Brazil infected the monkey *Alouatta fusca* with yellow fever virus and found that the virus could be recovered

from its blood on the 8th and 14th days but not on the 3rd. The animal died on the 15th day but the virus could not be isolated from the liver brain kidney or spleen. No symptoms of yellow fever could be observed during life or at autopsy. With ARTIGAS (p 67) he has tested the susceptibility of monkeys of the species *Cebus carver* to the same strain of virus. None of the animals died but some showed pyrexia depending largely on the route of infection. The virus could be isolated on the 4th but not on the 9th day.

SNEATH (p 67) has obtained 27 per cent. of positive protection tests with human sera from parts of British Guiana and concludes from this and previous work that yellow fever is endemic in the hinterland and that certain areas have more important foci of disease than others.

FINDLAY and MACCALLUM (p 68) attempted, unsuccessfully to cultivate the virus in media in which living cells were not included but succeeded when living cells of various kinds were added. They suggest that viruses have no enzymes of their own but are forced to borrow enzyme systems from the living cells they parasitize in order to build up their own specific substance. They (p 68) show that by bubbling oxygen through culture medium larger amounts can be used than was possible before and that there is thus a saving of labour in the growth of large quantities of yellow fever virus. There is no change in pathogenicity by this method.

FOX and GARD (p 69) show that when dried virus is kept at 4 C. in air having a moisture content of over 4 to 5 per cent. virulence is soon lost. With less moisture virulence is retained. Preservation in nitrogen results in retention of virulence for a longer period than preservation in air and these results suggest that inactivation of the virus is in part a process of oxidation. Virus should therefore be preserved in an atmosphere containing less than 4 per cent. residual moisture and either in nitrogen or in a vacuum.

PICKELS and BAUER (p 69) calculate the size of the particles of yellow fever virus as between 12 and 19 μ .

LEVAN (p 70) discusses measures taken against *Aedes aegypti* in Florida. *Gambusia* may be used successfully. Eggs of *Aedes* were found to be viable one year after having been laid in wooden egg troughs.

SMITH *et al* (p 70) report that almost 90 per cent. of a large number of persons vaccinated with virus 17 D showed immunity for periods up to 2 years.

C IV

CANTON. La fièvre jaune dans la circonscription de Dakar et dépendances [Yellow Fever in the Neighbourhood of Dakar and its Dependencies].—*Arch Méd et Pharm Nav* 1939 July-Aug-Sept Vol. 129 No 3 pp 387-410 With 2 figs. [18 refs.]

A general account of the subject including a summary in tabular form of previous epidemics of the disease in Senegal during the past 150 years, showing that epidemics are followed by silent intervals or latent periods of 7 to 37 years. The organization of the Public Health service at Dakar is described and finally methods of vaccination especially the mixed vaccination against variola and yellow fever [This is described somewhat grandiloquently as yet another magnificent and generous gift of French Science to the Tropics.] E Hindle

SMITH (E. C.) Yellow Fever Immune Bodies in Sheep Sera.—*Trans Roy Soc Trop Med & Hyg* 1940. June 27 Vol. 34 No. 1 pp 97-104

The author examined the sera of 100 sheep from Kano Northern Nigeria, used at the Medical Research Institute, Lagos, during 1939 by means of the mouse protection test for yellow fever and found that 32 gave a positive reaction.

Sheep were then inoculated intracerebrally with a suspension of neurotropic yellow fever virus, lethal for mice in 3 days. After 3 successive passages in sheep some animals showed symptoms similar to those caused by rabies virus, ending in general paralysis. Further passages in sheep were successful and later the virus was transferred back to mice by using as inoculum a 1 in 10 suspension of sheep's brain in saline. The virus was found to survive for at least 13 days in the brain tissue of sheep and after such passage its action in mice was retarded for one or more transfers the interval between inoculation and death being increased to about 5 instead of 3 days. Although two of the sheep succumbed after intracerebral inoculation, it is not quite certain that they died as a result of infection with yellow fever virus since no characteristic histological lesions were found.

Both intracerebral and subcutaneous inoculations of the virus were followed by the development of yellow fever immune bodies as shown by mouse protection tests.

It seems reasonable to assume that the yellow fever immune bodies in the sera of sheep in both Kenya and Nigeria develop as the result of an acquired and not a natural immunity but the possibility of diseases other than yellow fever producing them has not yet been definitely excluded. E H

SICÉ (A.) & BROCHEM (L.) Les manifestations sporadiques du typhus amaril au Soudan français et leur expression épidémiologique [Sporadic Manifestations of Yellow Fever in the French Sudan and their Epidemiological Expression].—*Bull Soc. Path Exot* 1940 Apr 10 Vol 33, No. 4 pp. 266-271 With 1 chart.

A description of 3 fatal cases of yellow fever, two European and one Syrian occurring in the French Sudan during 1936 accompanied by an epidemiological study of each case.

These are not the first to be recorded from this region, for two years previously one of the officials working in the bush died of yellow fever and 2 other Europeans who had transported this patient became infected but recovered.

These various isolated cases occurring in the jungle support the view that not only the native population may serve as a reservoir of infection but also some of the wild animals, and as there is a restricted fauna in the French Sudan it should not be difficult to determine this host.

E H

DA FONSECA (FLAVIO) Comportamento do bugio *Alouatta fusca* Humboldt inoculado com vírus amarelo Ambr [The Results of Inoculating *Alouatta fusca* with Yellow Fever Virus].—*Mem. Inst Butantan* 1939 Vol 13 pp. 363-366 [English version pp 367-370 With 1 fig.]

As long ago as 1914 BALFOUR suggested that the red howler monkey might be a reservoir of the yellow fever virus [this *Bulletin* 1914

Vol. 4 p 154] having noted that deaths among them preceded an outbreak of human cases. ARAGÃO about a quarter of a century later (in 1938) repeated this observation adding that mortality among the monkeys preceded the human outbreak by about 20 days.

The author has carried out experimental work inoculating *Alouatta fusca* with the Asibi virus from an infected *rhesus*. The former was bled three days after inoculation and four Swiss mice received each 0.03 cc of blood intracerebrally without effect. It was thought that three days had been insufficient for the virus to develop. More mice were inoculated with blood on the eighth day this time the result was positive and the virus re-isolated. The result was again positive fourteen days after the primary inoculation the monkey died on the following day but the virus could not be isolated from liver, brain, kidney or spleen. No symptoms of yellow fever were observed during life or at autopsy although the virus was in the blood from the eighth to the fourteenth day after inoculation. H H S

DA FONSECA (Flavio) & ARTIGAS (Paulo) Inquerito sobre a sensibilidade de *Cebus currieri* ao vírus amarelo [Susceptibility of *Cebus currieri* to the Yellow Fever Virus]—*Mem Inst Butantan* 1939 Vol. 13 pp 373-376 [English version pp 377-380 With 1 fig]

Several species of monkey have been tested for susceptibility to the virus of yellow fever. *Cebus macrocephalus* by DAVIS and SHANNON in 1929. *C. frontalis* by LLOYD and PENNA (1933). *Saimiri sciureus* by DAVIS (1930) and LLOYD and PENNA (1933). *Callithrix albicollis* by DAVIS (1930). *Ateles ater* by DAVIS (1931) and others.

Several cases of jungle yellow fever having been observed in 1936 in Botacatú, São Paulo the authors decided to investigate the susceptibility of the local monkey *Cebus currieri*. They used the Asibi strain preserved dry *in vacuo*. Some received the virus subcutaneously others intracardially intravenously intracerebrally or intraperitoneally. Those inoculated by either of the first two showed rise of temperature to below 40 C. during the first three days 40-40.5°C on the fourth and fifth days and ranging between 39.9° and 41°C. till the twentieth day. None of the animals succumbed and the virus could be isolated on the fourth day but not when attempts were made on the ninth day. Two of the monkeys inoculated intraperitoneally and one intravenously responded with rise of temperature up to 40.5° and 40.3 C respectively but attempts to re-isolate the virus from these were unsuccessful. H H S

SNEATH (P A T) Yellow Fever in British Guiana. Further Observations.—*Trans Roy Soc Trop Med & Hyg* 1940 June 27 Vol. 34 No 1 pp 91-96

An addition to the author's previous observations on the yellow fever problem in British Guiana. [See this *Bulletin* 1940 Vol. 37 p 90]

A further 217 specimens of sera including some from younger age groups in nine previously designated areas have been examined by means of mouse protection tests and 59 sera (27 per cent.) contained immune bodies against yellow fever. In addition a further 10 per cent gave inconclusive results. These results confirm the view that certain

areas of the Colony have greater importance as foci of the disease than others, and the inclusion of representatives from younger age groups makes it clear that yellow fever is endemic in the hinterland of British Guiana. E H

FINDLAY (G M) & MACCALLUM (F O) Experiments on the Growth
In Vitro of the Virus of Yellow Fever—*Brit. J. Experim. Path.*
1940 Aug Vol. 21 No. 4 pp 173-180

An account of results obtained in the course of experiments on the conditions necessary for the growth *in vitro* of yellow fever virus, with the ultimate object of finding a medium in which the virus will grow in the absence of living cells.

The strain of yellow fever virus generally used was the attenuated viscerotropic virus 17 D between the 200th and 250th passage. Prolonged growth of this virus took place in a serum Tyrode medium containing a high concentration of fowl or mouse embryonic tissue without any detectable increase in the neurotropism of the virus. When, in place of embryonic tissue adult mouse brain tissue was added to the medium no growth was obtained. Attempts to replace embryonic tissues by the minced tissues of larval *Aedes aegypti* were also negative. On the other hand the virus grew readily in serum Tyrode medium containing human placental tissue, or mouse carcinoma or sarcoma tissues.

Fowl embryo cells heated for 30 minutes at 56°C. failed to support the growth of virus.

The virus also failed to grow in serum Tyrode medium, in the absence of animal cells, to which the following had been added—
(a) An extract of trypsinized embryonic cells (b) an extract of embryonic cells exposed to ultra violet light (c) a complete amino-acid mixture (d) a complete amino-acid or both (e) living yeast cells or of either thiamine or nicotinic acid or both (f) living yeast cells or living *Bact. coli* (g) minced Sents EK filter pads.

The virus grew in a Tyrode medium with embryonic cells in the absence of serum and in a Tyrode serum medium with embryonic cells when either the Tyrode medium containing neither glucose nor serum, or a fluid medium containing only inorganic salts with embryonic cells in a Tyrode medium containing no glucose, or the Tyrode serum medium containing no glucose, or the fluid medium containing only inorganic salts.

It seems probable that the function of the living cell is not merely to provide a physical basis for the multiplication of the virus, and the authors suggest that possibly viruses possess few or no enzymes of their own and are forced to borrow enzyme systems from the living cells they parasitize in order to build up their own specific substance. E H

FINDLAY (G M) & MACCALLUM (F O) Culture of Yellow Fever Virus
In Vitro.—*Lancet*. 1940 Aug 10 pp. 183-184

The authors give details of a modification of the usual method of growing yellow fever virus *in vitro*.
The passage of 8 to 10 bubbles of oxygen per minute through the culture media permits the use of at least 30 cc. of the medium instead of the usual 6 cc. and thus reduces the amount of labour involved in the growth of large quantities of the virus.

Twenty four subcultures of virus 17 D have been made with this method and no change has been noted in its pathogenicity for mice moreover the titre of the virus has been equal and in some cases superior to that obtained by the ordinary culture in flasks. This method has also been applied successfully to the viruses of vaccinia and lymphogranuloma inguinale so it is probable that other viruses and possibly Rickettsiae may be grown under the same conditions.

E H

FOX (John P) & GARD (Sven) The Preservation of Yellow Fever Virus.—*Amer J Trop Med* 1940 May Vol 20 No 3 pp 447-451 With 2 figs [11 refs]

The duration of activity of dried yellow fever virus sealed in air was found to be almost directly proportional to its residual moisture content [This is the contention of the authors but the findings indicate that it was *inversely* proportional.]

Samples of dried vaccine virus were kept in air at 37.5°C and tested for virus activity by intracerebral inoculations into mice and the moisture content determined by the loss of weight after 6 hours at 110°C. An almost linear relation was found between the two factors with less than one day's duration of activity for samples containing more than 6 per cent. moisture. Similar virus samples stored in air at 4°C for periods up to a year were also tested and showed that when the moisture content was above the critical level of between 4 and 5 per cent the virulence was soon lost but that below this figure it was retained.

In one experiment samples of the same lot of virus were sealed either in air or in nitrogen and kept at 4°C. After 3 weeks at 4°C the sample in air had a titre of 1/75 and that in nitrogen 1/700. Suspensions of virus exposed to air at room temperature became non virulent within 24 hours, whilst similar suspensions kept under vaseline after nitrogen had been bubbled through the fluid, were virulent from 5 to 7 days later.

These results suggest that the inactivation of yellow fever virus is at least in part the result of an oxidation reaction which in dried virus bears a direct relation to the amount of residual moisture. It is evident that if samples are to be stored for up to a year the residual moisture should not exceed 4 per cent and if the material is sealed in a nitrogen atmosphere or in a vacuum the keeping qualities will be improved.

The only preparations found to contain less than 4 per cent residual moisture were dried either in the Mudd Flosdorf type of apparatus at room temperature or at -18°C in a large desiccator containing phosphorus pentoxide and continuously evacuated through a cold trap for at least 48 hours.

E H

PICKELS (Edward G) & BAUER (Johannes H) Ultracentrifugation Studies of Yellow Fever Virus.—*Jl Experim Med* 1940 May 1 Vol 71 No 5 pp 703-717 With 7 figs. [18 refs.]

A study of the behaviour of yellow fever virus particles in the unaltered serum from infected monkeys.

The virus was found to show a very high light absorption at wave lengths 320 to 440 μ and in a 1 cm. thickness of fluid the small amount

of virus present absorbed about as much light (approximately 25 per cent.) as all the normal serum proteins, which had a combined concentration some 1 000 times as great. The concentration of virus in the unaltered serum was found to be about 0.00005 gm. per cc., therefore a minimal infective dose for monkeys of 1 cc. of a 10^{-6} dilution would contain approximately 10,000 virus particles. It is likely however that many of these particles are inactive as a result of the action of antibodies in the serum.

Infective serum with a viscosity of 14 millipoises sedimented virus particles at rates lying between 18 and 30×10^{-11} cm./sec./dyne. There is evidence that this spread is the result of aggregation or association phenomena.

Computations of the size of the particles from these results agree in general with those made from ultrafiltration studies. Assuming that the density of yellow fever virus particles approximates to that of protein, the volume is computed to be at least that of a spherical particle with a diameter of 12μ , but a density of 1.15 gm. per cc. would give a diameter of 19μ .
E. H.

LEVAN (James H.) Measures Instituted for the Control of *Aedes aegypti*.—*Amer. J. Public Health* 1940 June. Vol. 30. No. 6. pp. 595-599. With 4 figs.

An account of measures used for the control of *Aedes aegypti* with special reference to Florida. It is emphasized that control is accomplished only by repeated painstaking inspections from house to house to find and to eliminate all artificial containers that may serve as breeding places. *Gambusia holbrooki* was used successfully in Key West to control the breeding of *Aedes* in dark covered drinking water cisterns. Before being placed in the cisterns the fish were kept overnight in chlorinated water containing doses of hypochlorite sufficient to produce a chlorine residue of 0.1 to 0.15 p.p.m.

Houses containing large numbers of adult mosquitoes were disinsectized by spraying with a concentrated pyrethrum extract in oil. Among breeding places for *Aedes* may be mentioned piles of old automobile tyres controlled by spraying with Paris green, and cemetery flower vases controlled by placing pellets of Paris green in each vase.

Eggs of *Aedes aegypti* laid in wooden egg troughs in the vicinity of Miami were still viable one year later adults being reared from them.

E. H.

LEVAN (J. H.) Viability of *Aedes aegypti* Eggs.—*Public Health Rep* 1940 May 17 Vol. 55 No. 20 p. 900

"This experiment disclosed that it is possible for *Aedes aegypti* mosquito eggs to remain viable in the vicinity of Miami Fla., for at least one year. No freezing weather occurred during the experimental period."

SMITH (Hugh H.) ROCA GARCÍA (Manuel) GAST GALVIS (Augusto) & CALDERÓN CUERVO (Héctor) Vacunación contra la fiebre amarilla en Colombia [Vaccination against Yellow Fever in Colombia].—Reprinted from *Rev. Facul. de Med. Bogotá*, 1940 July Vol. 9 No. 1 24 pp. With 1 map & 1 fig. (19 refs.)

In the period of nearly three years, from June 1937 to April 1940 there have been 175 496 persons in Colombia vaccinated against yellow

fever the virus used being 17 D Of these 2 139 have been tested and nearly 90 per cent have been found immune up to two years after
H H S

SOFFER (Fred L.) Progressos realizados nos estudos e combate da febre amarela entre a IX e a X Conferencias Sanitarias Panamericanas 1934-1938 [Advances in the Knowledge of Yellow Fever between 1934 and 1938]—*Arquivos de Hygiene* Rio de Janeiro 1939 Feb Vol. 9 No 1 pp 65-86 With 1 chart. [22 refs.] English summary

TRYPANOSOMIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

LAMBORN (p 72) reports the results of a sleeping sickness survey in Nyasaland. The problem of concealment of cases may be important but since most of the population is concentrated along the coast and near the rivers where conditions suitable for agriculture exist the occurrence of major outbreaks is unlikely. Minor epidemics may occur in that part of the population which lives in fly areas since villages are small and the resistance of the people is undermined by lack of protein in the diet. He suggests that vaccinators and dispensers should be instructed to send more blood films for examination that clearings of bush and removal of population should be carried out and that game should not be protected since it is a probable reservoir of *T. rhodesiense*.

BAX (p 73) has reported on the work of the Department of Tsetse Research, Tanganyika Territory for the years 1935-1938.

JACKSON (p 74) discusses methods of analysis of populations of *Glossina morsitans*. ZUMPT (p 74) discusses the distribution of subspecies of *G. palpalis* in the Belgian Congo.

HARDING (p 75) found that the feeding of *Glossina tachinoides* containing developing *T. brucei* on human blood did not produce any increase of resistance to normal human serum in the trypanosomes subsequently transmitted to a guinea pig by the bites of the fly.

McLETCHIE (p 76) gives the (low) infection rates found in man in two districts in Nigeria which had not previously been examined. A number of the patients were treated with 4,4'-diamidino stilbene in cases with no marked involvement of the nervous system this drug appears to be as effective as Bayer 205 but less effective than the combination of Bayer 205 and tryparsamide in the doses described. HARDING (p 77) obtained cure or improvement with 4,4'-diamidino stilbene in 4 mild or moderately severe sleeping sickness cases in N. Nigeria but in 9 moderate or severe cases no improvement was effected. In the majority of cases in this area the cerebrospinal fluid is pathological and the disease is severe so that the conditions of the test of the drug were not so favourable as may be the case in other areas.

HAWKING (p 78) has made chemical estimations of the concentration of Bayer 205 in the blood of three sleeping sickness patients who relapsed during or shortly after a course of treatment. The concentrations were less than in other patients and the author concludes that this defective accumulation was one of the main factors responsible for the relapses.

ROSS (p. 78) has compared the toxicity of trypanamide and neocryl in the treatment of neurosyphilis. Neocryl is not inferior to trypanamide as a therapeutic agent and is much less toxic, especially to the optic nerve.

OAG (p. 80) reports attempts to infect chick embryos with *T. brucei* and other trypanosomes.

Chagas's Disease.—GASIĆ LIVACIĆ and CHAIT (p. 80) report 11 further cases of Chagas's disease in Chile. Diagnosis was made by thick blood film examination, the Machado reaction or by xenodiagnostic methods.

MAZZOTTI (p. 81) records the results of inoculating mice with material containing *T. cruzi*. KOLODNY (p. 81) shows that an environmental temperature lowered to 40°–45°F transforms an ordinary mild infection with *T. cruzi* in young rats into an exceedingly acute and fatal disease.

PACHCHANIAN (p. 81) found infection with *T. cruzi* in 65 per cent. of *Triatoma Acidemannii* collected in Texas. *T. sanguisuga ambiguus* which is widely distributed in Florida, is capable of conveying infection with *T. cruzi* but has not been found infected in nature. GASIĆ LIVACIĆ (p. 82) discusses the infection rates of *Triatomidae* in part of Chile and in conjunction with BLATTIN (p. 82) gives a list of the animal reservoirs of *T. cruzi* in that country.

DUSSETT *et al.* (p. 83) discuss the Machado reaction, which is of particular value in chronic forms of the disease. In suspected cases positive reactions were obtained in some persons in whom the diagnosis was later confirmed, and in others who had lived in heavily infested districts, but no positive results were found in healthy persons who lived in districts known to be free from infection. The preparation of the antigen is described.

C II'

LAMBORN (W. A.) Survey for Sleeping Sickness.—Yusaland Protectorate Ann. Med. & San. Rep. for Year ending 31st December 1939. Section VIII pp. 26–27.

At the suggestion of the Director of Medical Services, it was decided to make a full examination of every man, woman and child living within 5 miles of any village or area in which cases of sleeping sickness had occurred during the last five years.

Lamborn was responsible for this work in the region south of the Kota Kota Hasungu road which roughly comprises the southern half of the district. He examined the blood of 2,851 persons by the thick film method without finding a single infection. He states that he is confident he examined practically the whole of the population concerned. Notwithstanding Lamborn's failure to find any cases, one came to light shortly after his departure. This naturally raised the question as to what extent other cases may have remained undiscovered. Concealment was the main difficulty experienced in coping with the epidemic in the vicinity of Dondra Bay from 1911 onwards and this may well have been responsible for the present instance.

In view of his study of the topographical distribution of *Glossina* in relation to population, Lamborn considers that any major outbreak of sleeping sickness would be extremely unlikely. As a result of the poverty of the soil over most of the area the population is concentrated along the coast where conditions suitable for the cultivation of the staple foods exist, and in the broad open stretches bordering the

rivers in the south where the cultivation of maize and other cereals as well as that of cotton, is carried out on a large scale. These are not the normal habitats of the fly but as concerns the population actually living within the fly area in which there are but few patches of land of agricultural value the position is very different for there exist the factors which might well lead to a minor epidemic. The villages are all small their clearings against the fly are ineffective the gardens are at a distance from the villages and the chances of infection are still further increased by the abundance of game animals from which it would seem that the tsetse have been deriving the infective strain of trypanosome. Moreover the resistance of these people may well have been lowered by their lack of a balanced diet as they get little nitrogenous food.

The author's recommendations are as follows

(a) that concealment of cases might be counteracted by making it the duty of vaccinators to take blood films of all sick persons encountered for examination by the medical officer

(b) that dispensers also might be instructed to submit to the medical officer films taken from all persons showing a temperature.

(c) that all small villages in the fly areas should be eliminated and should be settled together to form larger communities the activities of which in the way of clearings, etc. would have some real effect in dispelling the fly

(d) that the removal of villages from one site to another should not be permitted without authorization of the District Commissioner who should first satisfy himself that the site selected was outside the fly zone

(e) that indirect attack on the fly might be carried out through measures directed against the game. The operation of the Game Laws 1911 being suspended over the southern part of the district (a game reserve existing in the north of it)

As an additional need for the control of game it seemed to me that in that particular region game rather than man must be serving as the reservoir of the infecting organisms for the occurrence of cases in villages that are not within the fly area, all of which were isolated ones, seemed to preclude the possibility of there having been man to man infections. But the incidence of such cases over a long period of time and over a wide area is readily explicable if one assumes that *T. rhodesiense* has here become a parasite of wild animals in which as Corson has recently shown it may retain its infectivity to man for several years and perhaps indefinitely

(f) I suggested further that the question of rectifying the southern boundary of the game reserve might well be considered for it is traversed by the main road leading from Kota Kota to the west whereby it has become highly probable that flies are conveyed into the settlement by cars or on the backs of natives. The boundary should have been in my view to the north of this road.

W. Yorke

TANGANYIKA TERRITORY DEPARTMENT OF TSETSE RESEARCH *Tsetse*
Research Report 1935-1938 [BAX (S. Napier) Assistant Director]
—88 pp With 2 maps 6 figs & 2 plates 1940 Dar es Salaam
Govt Printer [5s]

This report covers a period of four years with special stress on the last year 1938. These four years have been momentous in the history of the Department. The first three were employed in the successful application on a comparatively small scale of methods which have been evolved in earlier years to destroy one of the most important species of tsetse *G. swynnertoni* in the development of

new methods and lastly in further important fundamental research in the bionomics of some of the chief species.

The report deals in turn with the various species of *Glossina* found in Tanganyika viz *G. morsitans* *G. pallidipes* *G. fuscipes* *G. brevipalpis* and *G. austeni*. The general distribution in Tanganyika of each species is stated, and experiments devised with the object of controlling the various species are described.

The next portion of the report deals with laboratory work.

No attempt is made by the author to summarize the conclusions to be drawn from the mass of work recorded in this report, and it appears almost impossible to deal with the matter adequately in a summary of reasonable length. Those interested must therefore consult the report in the original.

IV Y

JACKSON (C H N) The Analysis of an Animal Population.—*Jl Animal Ecology* London. 1939 Vol 8 No 2 pp. 238-246. With 1 graph. [Summarized in *Rev Applied Entom* Ser B 1940 Aug Vol 28. Pt. 8 p 140]

"The principle on which is based the author's estimation of a population of *Glossina morsitans* Westw. in a given area is that if flies are marked and released on a certain date, the proportion of marked individuals found in a random collection of flies on a subsequent date should be the same as the proportion of marked flies released to the total population on the date of release. This would hold good if the ratio of marked to unmarked individuals were not altered because some flies die or leave the area and others emerge or enter it. It is the purpose of this paper to describe modifications of the method that take into account rates of emergence, death and dispersal. In the first modification, flies marked on a certain date are recaptured at regular intervals and the rate of decrease in the proportion of marked flies recaptured is noted. Using this rate of decrease it is possible to calculate by methods described, what proportion of the population the marked flies represented on the day they were marked. In the alternative modification, which is the converse of the first and may be used as a control for it the calculation is based on the numbers, in a single collection of flies, of individuals that had been differentially marked at regular intervals previously.

ZUMPT (F) Die Verbreitung der *Glossina palpalis*-Subspecies im Belgischen Kongogebiet. [The Distribution of the Subspecies of *Glossina palpalis* in the Belgian Congo.]-*Rev Zool Bot. Afr* Brussels. 1940 Vol 33. No. 2 pp. 136-149 With 1 plate & 3 figs. [Summarized in *Rev Applied Entom.* Ser B 1940 Aug Vol 28. Pt. 8. pp. 140-141]

"The receipt from the Congo Museum at Tervueren of almost 2,300 examples of *Glossina palpalis* R. D. from different parts of the Belgian Congo has led the author to confirm the validity of the three subspecies erected by him and to dispute the conclusions of PATTON. The Congo region is particularly appropriate for investigations on this species, since all three subspecies occur there, together with intermediate forms. The author considers the terminology used by HENNIG (1936) in a paper on the genitalia of the cyclorhaphous Diptera to be more satisfactory than that used by himself or by

PATTON and has therefore adopted it. He describes the chitinous parts of the genitalia of the genus *Glossina* to explain the use of these terms.

He discusses the relative merits of the distinguishing characters and the methods of examination of specimens used by himself and PATTON. He points out that although the form of *G. palpalis* from which the species was described is unknown it was more probably the form that occurs in the region at the mouth of the Congo than that found inland, and he therefore gives the name *G. palpalis palpalis* to the former which was called var. *wellmani* Aust. by PATTON and considers that PATTON's type form is *G. p. fuscipes* Newst. and his var. *fuscipes* a mixture of *G. p. fuscipes* and *G. p. martinii* Zumpt. The synonymy of the three subspecies is shown in a list.

The identifiable localities in the Belgian Congo from which are recorded the three subspecies and the intermediate forms found in the material studied are given in lists and shown on a map. The subspecies *palpalis* is found only in the region round the mouth of the Congo as far east as Thysville. At Lundu and Lemba there are forms intermediate between *palpalis* and *fuscipes*. Subspecies *fuscipes* is the most widely distributed—it is present in its typical form in the immense rain-forest region between the Kassai Sankuru Congo and Ubangi rivers and extends eastwards as far as the Rift Valley north of Lake Kivu. The region south of the Sankuru is also part of the *fuscipes* area, but here preponderate atypical forms that have genitalia more or less resembling those of subspecies *martinii*. In the western part of this area typical *fuscipes* is also found, but the preponderance of atypical forms increases progressively to the east—these eventually give place to typical *martinii*. In the region of the headwaters of the Sankuru and Lomami rivers forms intermediate between *fuscipes* and *martinii* occur. Subspecies *martinii* is found in the Rift Valley south of Lake Kivu and in an area extending westwards to the headwaters of the Sankuru River. In the western part of this area are found females with genitalia resembling *fuscipes* although those of the males resemble *martinii*.

HARDING (R. D.) The Effect of a Diet of Human Blood on *Trypanosoma brucei* developing in *Glossina tachinoides*—*Ann. Trop. Med. & Parasit.* 1940 Sept 28 Vol. 34 No 2 pp 97-99

The majority of workers believe that the trypanosomes of man must in some way and at some time have been derived from *Trypanosoma brucei* but up to the present no one has succeeded in demonstrating how this step might have occurred. The experiments described in the present paper show an attempt to throw light on this problem.

Pupae of *G. tachinoides* were collected and hatched in the laboratory and a strain of *T. brucei* was obtained in guineapigs. This strain was found to have a fairly high virulence for guineapigs—it had a high resistance to reduced trypanamide *in vitro* concentrations of about 1 in 1 000 000 being necessary to kill all the organisms in a suspension within 24 hours at 37°C. The strain was sensitive to human serum in that all trypanosomes disappeared in pure human serum within about six hours.

It was found that the feeding of *G. tachinoides* containing developing *T. brucei* on human blood did not produce any increase of resistance to normal human serum in the trypanosomes subsequently transmitted to a guineapig by the bites of the fly.

W. Y.

McLETCHIE (J. L.) The Treatment of Early Cases of Nigerian Trypanosomiasis with 4,4-Diamidino Stilbene.—*Ann. Trop. Med. & Parasit.* 1940 Sept. 29, Vol. 34 No. 2 pp. 73-82.

This paper records the results of treating with diamidino stilbene a number of comparatively early cases of sleeping sickness in the Dasa and Toro districts of Northern Nigeria. The mass surveys gave the following results: Dasa, 14,815 persons examined and 198 (1.34 per cent) cases of sleeping sickness found; Toro, 25,099 examined and 298 (1.15 per cent) cases found.

Groups of patients from two villages were treated. From Bagel village in Dasa district, 8 cases were chosen. All had marked enlargement of the cervical glands; three denied symptoms; a fourth had pain in the neck-glands; and the remaining four gave a history of recurrent attacks of headache or fever. None showed wasting.

In all cases lumbar puncture was performed; the cell count varied from 2 to 9 and in six there was an excess of globulin. Treatment was given on the 1st, 3rd, 5th, 7th, 8th and 9th days. Diamidino stilbene was injected intravenously, except on the 5th day when intramuscular injections were given to all except two cases. The dose varied from 0.7 to 2.2 mgm. per kilo. The results are set out in a table, showing the condition before treatment and at three weeks and six months, respectively after treatment. All the cases apparently did well. The excess of protein in the cerebrospinal fluid disappeared, and the fluid returned to normal. One patient died, after aborting four months after completion of treatment.

The six patients from Laro village in Toro district were in a more advanced condition. Glandular enlargements were less marked, all gave a history of recurrent attacks of fever at frequent intervals, and all but one had lost strength. Lumbar puncture was permitted in three cases only; the cell count in these cases was 9, 17 and 198 cells per cmm., respectively. In two cases the protein was normal, but in the case with the heavy cell count there was a considerable excess. This patient died nine months after completion of treatment. The remaining five patients were examined six months after treatment; all insisted that symptoms had not returned, but only one looked really well, and one other looked better than before treatment. Both had gained weight. The remainder appeared much as before treatment, despite the apparent absence of symptoms; in none of them were trypanosomes found. In the two cases in which lumbar puncture had been performed before treatment the cerebrospinal fluid was again examined; the cell count had fallen to 5 and 6 respectively and there was still no excess of globulin in either.

The following summary is given —

"The findings of mass surveys for trypanosomiasis in two previously unexamined districts of the Bauchi Province of Northern Nigeria are given. Infection-rates were low.

"Fourteen cases of sleeping sickness were treated with diamidino stilbene. The first group of eight cases were of a mild nature; they received an average of 8.8 mgm. per kilo of the drug; after six months, seven were in good health; one had died following an abortion. The second group of six showed a more advanced condition; they showed reaction to intravenous injection of the drug and received an average of only 6.3 mgm. per kilo; they appeared to improve during treatment; one died nine days after treatment; after six months only two were really well, though symptoms appeared to be absent in all five.

Nine cases of a severity intermediate between the first two groups had Bayer 205 alone. After seven months symptoms were in abeyance but improvement in general condition was not marked.

Seven mild cases from the same village as the first group had Bayer 205 and tryparsamide. After five months they were well, showing more improvement in general condition than did any of the other groups.

Trypanosomes disappeared from the gland juice after one to three injections of diamidino stilbene. Sclerosis of glands was much the same in all groups and gland juice was sterile at the last re-examination in all cases.

Cases were too few and the original changes in the cerebrospinal fluid too slight, for alterations as the result of treatment to be of much significance. After treatment with diamidino stilbene no case showed increase in the cell count or in the globulin content of the cerebrospinal fluid beyond that found initially and four fluids previously abnormal in some respect, had become normal. With the other drugs, slight increases either in cell count or in globulin content followed treatment in some cases and no specimen became strictly normal.

The toxic effect of the drug is described. This is slight. Reaction occurs during intravenous injection usually decreases in a few minutes and does not last more than 20 minutes. Care is required in the preparation and injection of the solution. The dosage given is subject to the reaction produced in the individual, but most patients can stand from 1 mgm. to 1.5 mgm. per kilo and some 2 mgm. per kilo.

In cases with no marked involvement of the nervous system, diamidino stilbene appears to be as effective as Bayer 205 but less effective than the combination of Bayer 205 and tryparsamide in the doses described. The shorter course, eight to nine days or even less is a great advantage but courses of say ten injections are probably advisable for routine treatment.

W Y

HARDING (R D) A Trial with 4,4-Diamidino Stilbene in the Treatment of Sleeping Sickness at Gadau, Northern Nigeria.—Ann Trop Med & Parasit 1940 Sept 26 Vol. 34 No 2 pp 101-105

The author has tested diamidino stilbene in the treatment of a number of sleeping sickness cases at Gadau in Northern Nigeria. He states that as sleeping sickness differs so widely in its manifestations in different parts of Northern Nigeria, it is of the greatest importance when attempting to estimate the value of a new preparation to have a clear knowledge of the type of disease to be treated and also of its reaction to drugs already proved. The author therefore gives a brief account of the disease as it is found at Gadau.

Among 100 unselected cases coming for treatment during 1939 enlarged cervical glands were found in only 71 of which 62 showed trypanosomes. Blood films were positive in only 22, but no less than 94 had a pathological spinal fluid. The majority of the patients suffered from nervous lesions e.g. marked somnolence, mental changes, tremor or ataxia and in at least 28 per cent the disease manifested itself chiefly in the guise of a pituitary thyroid syndrome, as evidenced by adiposity, myxoedema, and other signs. Severe itching was a troublesome complaint amongst most of the advanced cases. Evidence was obtained that once the nervous system becomes definitely involved the natural course of the disease is rapid.

The conclusions are as follows —

Of 13 sleeping sickness cases treated at Gadau during 1939 with diamidino stilbene three mild or moderately severe cases were clinically

cured and one improved, though in no case did the C.S.F., when initially pathological, return to normal. Of the remaining nine moderate or severe cases, one was clinically unchanged and eight were definitely worse, while all showed greater disturbance of the C.S.F. after treatment followed by a varying period of observation. The cases seen at Gadan are in general, of a severe type and require a long course of antrypol and tryparamide before apparent cure is obtained even then the C.S.F. is usually just outside normal limits. Diamidino stilbene is therefore subject to a very severe test when tried out on such cases. Nevertheless, after making allowances for this factor and for the relatively very small doses of the drug employed, the author is forced to conclude that the results are not very encouraging and do not justify the hope that the drug would have been as efficacious as antrypol and tryparamide, even if used in large doses over a long period. It is possible that the present form of the disease at Gadan, resulting from a severe epidemic giving way in the course of years under intensive treatment to an endemic state of low incidence, is peculiarly unsuited to the drug, and that much better results may be expected elsewhere, as other workers' trials in fact indicate (Lorke, 1940)

IV Y

HAWKING (Frank) Three Cases of Trypanosomiasis Relapsing during Treatment with Bayer 205 (Germanin).—*Trans. Roy Soc Trop Med & Hyg* 1940 Aug 16 Vol 34 No 2 pp 217-228. With 1 graph

This paper describes three cases of human trypanosomiasis at Kahama, Tanganyika, which relapsed during or shortly after a course of treatment with Bayer 205 and in which chemical estimations were made of the concentration of the drug in the blood. Clinical details of the three cases are given. The relapses occurred 6, 9 and 19 days respectively after the last dose of the drug. Numerous trypanosomes appeared in the blood, and were accompanied by a febrile reaction. Although no further treatment was given at the time the trypanosomes disappeared from the blood in a few days, and the fever subsided. Strains of trypanosomes obtained from two of these patients were tested in rats, but no evidence of any abnormal resistance to Bayer 205 was discovered. Chemical estimations of the concentration of the drug in the blood of the patients, at the time of the relapse and during subsequent treatment, showed that the accumulation of the compound in the blood was defective as compared with that of patients studied in a previous series. Hawking concludes that this defective accumulation was one of the main factors responsible for the relapses.

IV Y

ROSS (A. O. F.) Comparison of the Toxicity of Tryparamide and Neocryl in the Treatment of Neurosyphilis.—*Brit Med J* 1940 Aug 31 pp 283-284

In this paper the author compares the toxicity of tryparamide and neocryl (sodium succinylomethylamide-p-arsenate) [this Bulletin, 1936 Vol. 33, p. 659]. His observations were based on a series of over 570 cases of neurosyphilis treated between 1936 and July 1939 with one or other of these drugs. The standard dose of each drug was 3 gm intravenously, once a week, until a total of 30 gm. had been administered but in a few

cases owing to age infirmity or other condition calling for caution smaller doses were given. The author summarizes the toxic manifestations observed in the case of each drug in the following tables —

TABLE I.—Summarizing the Toxic Manifestations observed in 256 cases treated with Tryparsamide

Type	No of Cases.	No showing Toxic Signs before receiving 10 gm. of Drug	Total No. showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions						
					Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I.	30	2	3	10	1	0	1	1	0	0	3
Tabes	118	23	49	43	10	8*	23	4†	4	5	54
Taboparesis	11	1	2	18	1	0	0	1†	0	0	2
Neurosyphilis	45	6	17	38	4	4	10	4	0	0	22
Late syphilis	55	4	7	13	2	0	2	1†	2	0	7
Totals	256	36	78	30	18	12	36	11	6	5	88

* One developed purpura. † One became blind.
N.B.—47 out of the 88 reactions affected vision.

TABLE II —Summarizing the Toxic Manifestations observed in 314 cases treated with Neocryl

Type	No. of Cases	No showing Toxic Signs before receiving 10 gm of Drug	Total No showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions						
					Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I.	58	0	3	5	0	1	0	1*	1	0	3
Tabes	90	1	7	8	3	0	0	2*†	1	1	7
Taboparesis	31	1*	3	10	2†	0	0	1*	0	0	3
Neurosyphilis	50	4	9	18	2	4	0	0	3	0	9
Late syphilis	85	1	5	6	2	2	0	0	1	0	6
Totals	314	7	27	9	9	7	0	4	6	1	27

* One had optic atrophy before treatment and the visual condition deteriorated 9 other cases with optic atrophy were treated without ill effect.
† One suddenly became blind † One died of toxic jaundice.

The following are the summary and conclusions —
A series of 570 unselected cases were treated either with tryparsamide or neocryl. The drugs were given in equal amounts, and 256 received tryparsamide and 314 neocryl.
About twelve months after the work had been completed a survey was made of the records with a view to comparing the therapeutic effects and toxic manifestations of the two compounds. This survey confirmed the earlier impression that neocryl is not in any way inferior to tryparsamide as a therapeutic agent and that toxic effects from its use are much less common than are those caused by tryparsamide. Of 256 cases treated with tryparsamide 78 exhibited toxic manifestations whereas of 314 cases treated with neocryl only 27 showed toxic signs.

"Both compounds may cause jaundice, dermatitis, and other undesirable reactions that are seen after the administration of trivalent arsenicals but it is chiefly in its relative innocuity to the optic nerve that the advantages of neocryl become apparent.

"Visual disturbance occurred in 47 of the 78 cases which reacted unfavourably to trypanamide in 38 of these the signs were subjective but in 11 they were objective, 3 of the latter patients becoming totally blind.

"Neocryl could, however be held accountable for only one case of visual damage. This occurred in a patient with tabes dorsalis, who unfortunately became suddenly blind before treatment the patient did not complain of subjective signs and the acuity of vision was apparently good, but it was not possible to have his eyes examined by an ophthalmic surgeon.

"It would appear from this analysis that neocryl is to be preferred in all cases of neurosyphilis in which the administration of pentavalent arsenicals is necessary. II 1

BERGMAN (Herman) & SHAFER (Bertram) Reactions to Trypanamide.
A Review of Ten Years Experience.—*Brit J. Ven Dis* 1940.
July-Oct. Vol 18 PP 145-165 74 refs

OAG (R Knight) Attempts to cultivate Trypanosomes in the Developing Egg.—*Jl Path & Bact* 1940. July Vol 51 No. 1
P 137

Thirty-five chick embryos, 8 to 12 days old, were inoculated with the blood of a mouse heavily infected with *Trypanosoma brucei*. Seven of these embryos showed trypanosomes three or four days later their blood was inoculated into 31 other embryos, with negative results. In another experiment 9 embryos, 19 days old, were inoculated with infected mouse blood and allowed to hatch, but none of the resulting chicks was infected. Similar negative experiments were performed with *T. congolense* and *T. equiperdum*. [See also this Bulletin 1940 Vol 37 PP 12, 409] II 1

GARCÉ LIVACIÉ (Gabriel) & CHART (Pablo) Once nuevos casos de enfermedad de Chagas en Chile. Once More Cases of Chagas's Disease in Chile.—*Rev Chilena de Hig y Med Preventiva* 1939
July-Dec Vol 2 No. 7-12 PP 215-245 With 11 figs.
133 refs.

The authors give brief details of eleven more cases of Chagas's disease seen by them in Chile. There is nothing special to note about their clinical symptoms. The ages of the patients ranged between 5 and 36 years. Diagnosis was made in one by examination of the blood in thick drop and confirmed by a positive Machado reaction and by xenodiagnosis in another by inoculation into a dog and a positive Machado reaction in the remaining nine by the xenodiagnostic method supported, in seven of them, by a positive Machado reaction. Geographically nine were in the Department of Huasco (6 in Domeyko one each in Cachivuyo, Valagur and Conay) one in the Department of Chafaral and one in Elqui. H H S

GARCÉ LIVACIÉ (Gabriel) Primer caso de enfermedad de Chagas confirmado en Domeyko mediante el xenodiagnóstico [The First Case of Chagas's Disease confirmed by Xenodiagnosis in Domeyko].—*Rev Chilena de Hig y Med Preventiva* 1939 July-Dec Vol 2 No. 7-12 PP 211-214 With 1 fig

MAZZOTTI (Luis) Resultados obtenidos por la inoculación de ratones con pequeñas y grandes cantidades de *Trypanosoma cruzi* [Results of Inoculating Mice with *T. cruzi*]—*Rev. Inst. de Salubridad y Enfermedad Trop.* Mexico 1940 May Vol. 1 No 2. pp 181-187

For obtaining material for injection the author used either the intestinal contents of an infected *Triatoma* diluted with saline or the citrated blood of infected mice. The number of animals used was few and the results showed considerable variation but may be briefly recorded.

Six mice were injected by the first named material the number of parasites ranging from 800 to 8 000. Some showed parasites in their blood after an interval others which had received the same number by injection did not do so at any time. Thirty-eight others were injected with the citrated blood and with trypanosomes from 46 to 16½ million. Those receiving the smaller numbers 46-92 did not die during an observation period of 3 weeks those receiving larger quantities, 1,850 000 and upwards died within that period, but none earlier than 14 days the interval being taken probably by the trypanosomes gaining access to the internal organs and producing lesions serious enough to kill. It is noteworthy that some of the animals receiving the lower (of the large) dosage exhibited more marked effects than others receiving the largest amounts

H H S

KOLODNY (Maxwell H) The Effect of Environmental Temperature upon Experimental Trypanosomiasis (*T. cruzi*) of Rats.—*Amer. J. Hyg.* 1940 July Vol. 32. No 1 Sect. C pp 21-23

The effect of environmental temperature on resistance to infection is a problem of great importance. The author briefly refers to previous observations on this subject dealing with infections due to typhus rickettsiae and encephalitis. The present work reports analogous observations relating to the effect of abnormal environmental temperatures upon the resistance of albino rats to experimental infection with *Trypanosoma cruzi*.

The author summarizes his observations as follows

Abnormal deviation of environmental temperature is capable of influencing the resistance of young rats to experimental infection with *Trypanosoma cruzi*. While raised environmental temperature (90° to 95°F) increases only slightly the resistance of the rats to infection with this parasite a lowered environmental temperature (40 to 45°F) generally results in heavy blood-stream invasion, several times more intense than is usually seen in animals of the same age maintained at ordinary room temperature. Under these conditions an ordinarily mild infection becomes exceedingly acute and almost invariably goes on to a fatal termination.

W Y

i. PACKCHANIAN (Ardzroony) Natural Infection of *Triatoma heidemannii* with *Trypanosoma cruzi* in Texas.—*Public Health Rep.* 1940 July 19 Vol. 55 No 29 pp 1300-1306 With 2 plates [11 refs.]

ii. — Experimental Transmission of *Trypanosoma cruzi* Infection in Animals by *Triatoma sanguisuga ambigua*—*Ibid.* Aug 23 No 34 pp 1526-1532. With 2 plates. [13 refs.]

1. The author found that 65 per cent of *Triatoma heidemannii* collected during 1937 and 1938 in Temple Texas were naturally

infected with *Trypanosoma cruzi*. The strain of *cruzi* produced infection in monkeys mice rats and guinea pigs.

II. This paper describes the experimental infection of *Triatoma sanguisuga ambigua* with *Trypanosoma cruzi* and the transmission of the infection by this insect to susceptible animals.

Triatoma sanguisuga ambigua is widely distributed in Florida. During 1936-1937 about 300 of these bugs collected in Sarasota were examined and found to be free from *T. cruzi* infection. Over 50 people bitten by these insects in Civilian Conservation Corps camps during 1936-37 manifested various allergic symptoms and occasionally a small abscess but none of them became infected with trypanosomes.

W Y

GASTÉ LIVACIC (Gabriel) Índice de infestación por *Trypanosoma cruzi* de los triatomídeos del departamento de Elqui. [Degree of Infestation with *T. cruzi* of Triatomidae in Elqui Department, Chile.]-*Rev Chilena de Hig y Med. Preventiva* 1939 July-Dec. Vol. 2 No 7-12 pp 205-210. With 1 map

The author examined Triatomidae obtained in 15 localities in the department and found among a total of 1,241 that 355 or 28.6 per cent. were positive for *T. cruzi* infection. The numbers obtained for examination were usually small, in five localities only did they exceed a hundred and these may be mentioned. In Tres Cruces of 241 examined, 102 or 42.3 per cent. were positive. in Pailuano 35 out of 194 (18 per cent.) in Montegrando 62 out of 159 (38.9) Pabellon 52 out of 139 (37.4) and Nueva Elqui 8 out of 129 (6.2 per cent.) In the first four of these, imagines, nymphs and larvae were positive the imagines particularly. in Nueva Elqui larvae were not found infected, but only 13 of them were examined, whereas 45 adults yielded 6 positive and 71 nymphs two positive. Altogether of 506 adults 204 were positive (40 per cent.) of 324 nymphs 71 (21.9 per cent.) of 408 larvae 80 (19.6 per cent.)

H H S

GASTÉ LIVACIC (Gabriel) & BERTIN (Victor) Animales reservorios de virus de la tripanosomiasis americana en Chile. (Comunicación preliminar) [Animal Reservoirs of the Virus of American Trypanosomiasis in Chile.]-*Rev Chilena de Hig y Med. Preventiva* 1939 July-Dec. Vol. 2 No 7-12 pp 247-261 With 7 figs [22 refs.]

Up to the present animal reservoirs of the virus of Chagas's disease comprise 22 wild (or non-domestic) and the dog and the cat. The former include five species of *Dasypus* (*D. novemcinctus sexcinctus uncinatus hybridus* and *paraguayensis*) three of *Chaetophractus* (*C. vellerosus vellerosus C. v. panamensis* and *C. villosus*) three of *Didelphys* (*D. aurita marmosipalis* and *virginiana*) two of *Grissonella* (*G. ratelina* and *kurrami*) and the following *Zoedys pichy caninus* *Tolipentis matacos* *Leontocline crassicauda* *Tayra barbara* *Marmosa muris* *Chrysothrix sciurus* *Neotoma fuscipes* *Epimys norvegicus* and *Paradolopex culpaeus culpaeus*

In some districts the proportion of animals infected is high, e.g. in Doneyko 20 out of 68 examined dogs show a higher percentage of infection than do cats, 34.8 and 18.1 per cent. respectively. In young

animals diagnosis is usually readily made by examination of a thick drop of blood, in older animals the xenodiagnostic or other method is generally needed.
H H S.

DUSSETT (Eduardo) FAIGUENBAUM (Jacobo) & NEGhme (Amador)
La reacción de Machado en Chile Comunicación preliminar
[Machado's Reaction in Chile]—*Rev Chilena de Hig y Med Preventiva* 1939 July-Dec Vol. 2. No 7-12. pp 197-203

The Machado (or more correctly Machado-Guerreiro) reaction is a complement fixation test devised in 1913 for diagnosis of American trypanosomiasis. The authors of this article record their findings in 50 suspected cases 5 healthy persons 7 syphilitics and 4 puppies artificially infected. They find it of particular value in chronic forms of the disease less in acute stages rarely being positive till 30 days after infection. It is not absolutely specific but rather a group reaction since positive results are obtained with sera of patients with African trypanosomiasis and leishmaniasis. The antigen is obtained from the spleen of infected puppies not more than two months old and the method is detailed. This consists of cutting the spleen into small pieces ground in a mortar with fine quartz and adding to the extract double its weight of distilled water and the organ's weight of glycerine and allowing maceration to go on for 4 days at room temperature and for about the same period in the refrigerator. The supernatant liquid is filtered first through paper and then through a Seitz filter.

Of 50 sera sent up from suspected patients 38 were positive 8 of these were later confirmed by xenodiagnostic and thick drop methods and the others lived in heavily infected districts. Repeated tests of the sera of five healthy subjects who had not lived in infected districts were always negative as they were also in 7 syphilitics who gave strong Wassermann and Kahn reactions. Of the dogs experimentally infected two infected more than two months previously gave positive reactions two infected 12 and 15 days before were negative.

H H S

TROPICAL DERMATOLOGY

A REVIEW OF RECENT ARTICLES VII*

Blastomycosis—A general review of the subject has been presented by CALLAWAY and MOSELEY¹ who stress the fact that they are dealing with primary cutaneous Gilchrist's Disease. They are convinced that many of the strains of fungi which have been isolated are really all one and the same organism and that this can be proved by their serological and morphological characteristics Conant's proposal

* For the sixth of this Series see Vol. 37 pp 95-104

¹ CALLAWAY (J Lamar) & MOSELEY (Vince) Primary Cutaneous Gilchrist's Disease.—*Southern Med. J.* 1940 June. Vol. 33 No. 6 pp 622-625
[13 refs.]

3. Such primary lesion never ulcerates, but is always a "closed papule"—another distinction from syphilis or yaws.

4. Transmission may be successfully carried out from any clinical type of lesion at any stage of the disease. If any intermediate host acts as transmitting agent there is no reason to suspect any cyclical development within it.

5. Since infection may follow deposition of infective material on any little abrasion direct transference is very probable in nature.

6. Syphilis and Mal del Pinto are not mutually antagonistic and neither affords immunity to the other.

7. One attack of pinta does not protect against re-infection. Such was found to be possible two months after recovery from the disease in the primary period and approximately four years after recovery from the dyschromic type. H H S

LEÓN Y BLANCO (Francisco) La lesión inicial en el mal del pinto [The Primary Lesion in Pinta].—*Rev Med Trop y Parasit* Habana 1940 Jan.-Feb Vol. 6 No. 1 pp 21-37 With 9 figs on plates [50 refs.] English summary

The site of the primary lesion is practically always on some uncovered part of the body. Of 254 cases in 163 it was on the leg or dorsum of the foot on the thigh in 3 the buttock 3 the forearm or dorsum of the hand 67 arm 3 face 14 neck 1. It appears as a papule after an incubation of 7 to 20 days, becoming in 30 to 50 days an erythematous squamous patch, at the periphery of which other papules may develop and spread similarly. Skin rashes or multiplication of papules for which the author suggests the term *Pintida* (v.s.) characterize the second stage and are seen usually in 5-12 months from the appearance of the initial lesion which itself continues to develop at the same time. The third stage is the dyschromic with coloured or achromic spots, keratoderma or superficial atrophy.

During the first stage the W.R. is negative and superinfection is possible in the second stage the reaction becomes positive but superinfection is still possible. In the third nearly all (some say 100 per cent) give a positive W.R. and in this stage attempts at experimental superinfection do not succeed. The *Sp. herrejoni* can always be found between the cells of the malpighian layer of the skin in the initial lesion. The dermis is infiltrated with many lymphocytes and plasmocytes, but polymorphonuclears and eosinophils are few. melanophores and histiocytes are present. Hair follicles and coiled sweat glands are surrounded by infiltration cells. H H S

LEÓN Y BLANCO (Francisco) La presencia de treponemas Herrejoni en la serosidad de las grietas, fisuras y rasguños de las lesiones cutáneas en el mal del pinto [The Presence of *Spirochaeta herrejoni* in the Discharge from Cutaneous Lesions of Pinta].—*Rev Med. Trop y Parasit* Habana 1940 Jan.-Feb Vol. 6 No. 1 pp 47-48. English summary

The cutaneous lesions of pinta do not spontaneously ulcerate like those of syphilis or yaws but by scratching they may become fissured and so open lesions. In the serum exuding from such lesions the spirochaetes were found in 29 out of 41 patients and experiment has shown that the disease is readily transmitted to a slight wound,

scratch or abrasion on a healthy skin by the discharge from a pinta lesion in other words the serum oozing from a fissured pinta lesion is infective and virulent
H H S

LEÓN Y BLANCO (Francisco) La eosinofilia local en el mal del pinto [Local Eosinophilia in Pinta Lesions].—*Rev Med Trop y Parasit* Habana 1940 Jan-Feb Vol 6 No 1 pp 49-51
English summary

Eosinophilia is not always present in pinta lesions (see above) but in the scaly and infiltrated lesions and those with keratosis eosinophils are seen scattered in the infiltrations and in the neighbourhood of the small vessels. Where the inflammatory reaction is slight they are scarce but are usually in considerable numbers in the period of extension of lesions though one patient may show many another only a few the same applies to patients with adenitis. H H S

LEÓN Y BLANCO (Francisco) Histología patológica de las lesiones cutáneas y de los ganglios linfáticos en el mal del pinto [Histology of the Skin Lesions and Glands in Pinta].—*Rev Med Trop y Parasit* Habana 1939 Nov-Dec Vol 5 No 6 pp 329-345
With 16 figs. on 8 plates

LEÓN Y BLANCO (Francisco) Las reacciones de Wassermann y Kahn en el periodo primario del mal del pinto [The Wassermann and Kahn Reaction in the Primary Stage of Pinta].—*Rev Med Trop y Parasit* Habana 1940 Jan-Feb Vol 6 No 1 pp 39-42. [11 refs.] English summary

Seventeen experimentally inoculated persons and 39 naturally infected patients in the first stage of pinta were examined as to their serological reactions. The tests were carried out at the time of inoculation of the former group 20 days later and when treatment was begun and in the latter group before start of treatment. In no case was a positive reaction given to either the Wassermann or the Kahn test.
H H S

LEÓN Y BLANCO (Francisco) Acción de la fiebre sobre las lesiones cutáneas en el mal del pinto [Effect of Fever on the Lesions of Pinta].—*Rev Med Trop y Parasit* Habana 1940 Jan-Feb Vol 6 No 1 pp 43-45

Eight patients with pinta developed fever 7 of them malaria (4 *P. vivax* 3 *P. falciparum* infections) and 1 smallpox. After the fever started, search for *Sp. herreysii* revealed none. The malaria patients had had 10 or more accessions of fever. They were treated with atabrin and the patients were observed every week for two months in some the pigmented spots almost entirely disappeared after the febrile attacks in others there was a smaller degree of change. After five weeks however fresh signs of activity appeared the patches acquired an erythematous border and the pigmentation returned, but only in parts of the original sites and spirochaetes were few and could be found only after prolonged search. The fever seemed to exert a lethal effect on the spirochaetes but did not destroy them all. If a patient presents himself with signs indicative of pinta and spirochaetes cannot be found enquiry should be made as to whether he has recently suffered from malaria or other febrile condition.
H H S

SOBERÓN Y PARRA (Galo) Sobre el origen del tratamiento del ma del pinto por los arsenicales y bismutícos en México. [Arsenical and Bismuth in the Treatment of Pinta in Mexico.]—*Rev. Med. Trop. y Parasit.* Habana, 1940. Jan.-Feb. Vol. 8 No. 1 pp. 53-54.

Till about 20 years ago pinta was commonly treated by mercury injections, or by inhalation of the vapour as occurred in workmen engaged in calcining cinnabar in the mines of Huizúcar Guerrero. From 1920 onwards the author employed arsenicals and bismuth salts for this disease and found that a total dosage of 90 cgm. of salvarsan cured nearly all pinta patients completely except for the white patches which rarely were cured. H H S

TRIPEDI (B. P.) & MUKHERJEE (B. N.) Actinomycetosis and Mycotic Lesions, with Special Reference to Madura Foot.—*Brit. Jl. Surg.* 1939 Oct Vol. 27 No. 108 pp. 256-265. With 10 figs. (6 coloured) [11 refs.]

The authors place on record three more cases of Madura mycosis. Of 32 cases collected from the Medical College Calcutta, in 23 the part affected was the foot in 3 the arm, the jaw and breast each 2, 1 in the back and 1 of the sigmoid. Of the three fresh cases reported, 2 were due to *Actinomyces maduras* with the oedroid type of granules, the second being complicated by a *Staph aureus* infection. The third patient was a Hindu male of 40 years with a painful and swollen foot the condition had first been observed 12 years before. The skin of the foot was black, tense with discharging sinuses, and section of the amputated foot presented the appearance of inflamed tissue dusted with charcoal. Attempts at cultivation of the fungus yielded a hyphomycete with lateral and terminal buds but no true branching. It grew well on nutrient agar giving white star-shaped woolly colonies with a central blackening. Club-formation from tissue reaction was seen in the first two cases, but not in the third. [There is no mention of any attempts to identify the fungus in the third patient.]

H H S

NEGROSI (Pablo) & TET (Juan A.) Estudio micológico del primer caso argentino de micetoma [sic] maduro-micótico de granos negros. [Mycological Study of a Black-grain Mycetoma in the Argentina.]—*Rev. Inst. Bacteriológ.* Buenos Aires, 1939 Dec. Vol. 9 No. 2. pp. 176-189. With 6 figs. [24 refs.] English summary

This study was in connexion with what is believed to be the first Argentine case of maduromycosis with black grains. It deals solely with the fungus and no clinical history of the patient is given. The grains had an average diameter of 3 mm. a septate mycelium 3 μ thick and numerous chlamydospores. On solid media it formed green velvety colonies with yellow zones. Its optimum temperature for growth was 30°C., and it grew best on media with galactose sucrose maltose, dextrin, mannitol and sorbitol, less well on dextrose mannose and lactulose and still less on lactose and inulin. Sugars were not fermented. It slightly liquefied gelatin. The fungus proved to be *Aspergillus* (*Exserohypha*) *chevalieri* Mangin 1909. H H S

TORRES (D M Gonzales) Actinomycetoma toracico a grãos pretos Considerações sobre um caso [Black-grain Actinomycosis of the Thorax.]—*Arquivos de Biol* S Paulo 1940 Jan Vol. 24 No 223 pp 8-10 With 6 figs

The case of a man of 23 years of age engaged in cotton cultivation is related. Six years previously he noticed some small ulcers (flictenas) and nodules on the right shoulder and upper part of the right side of the chest. In the early days they were associated with itching and discharged a blood-stained fluid with small black granules. During the first two years he lost some kilos in weight. He was treated with iodine and his condition fluctuated now better now worse. A photograph shows the present state of the lesions they are no longer painful nor itching are often crusted over fistulous openings excreting blood stained serum. The fungus was cultivated on Sabouraud's medium and presented a black centre with pale periphery.

The patient was given iodides *per os* and by injection but he evinced marked intolerance and this form of treatment had to be stopped. Radiotherapy benefited but did not cure vaccines were badly borne and gave rise to violent pain at the site of the lesions. Though improved the lesions still persist and recently have remained stationary. The patient is to report again in 3-4 months. H H S

LACAZ (Carlos da Silva) O iodo no tratamento das micoses. [Iodine in the Treatment of Mycoses.]—*Ann Paulist Med e Cirurg* 1940 May Vol. 39 No 5 pp 379-399 [52 refs.] English summary

This is a general account of mycoses and their treatment with iodine in various forms. By way of preliminary the author gives Floriano de Almeida's classification followed by a score or so of formulae of iodine preparations taking the mycoses in subgroups and noting their relative susceptibilities to the drug and finally describes the symptoms which may be produced by iodine in those with an idiosyncrasy to iodine. H H S

CARRIÓN (Arturo L.) Estudio micológico de un caso de micetoma por *Cephalosporium* en Puerto Rico [Mycological Study of a Case of Mycetoma associated with *Cephalosporium* in Porto Rico]—*Mycopathologia* The Hague 1940 Mar 26 Vol. 2. No 3 pp 165-170 With 23 figs on 2 plates.

This article gives a detailed account of an investigation into the causative fungus of the case referred to in this *Bulletin* 1940 Vol. 37 p 96 and the clinical aspects of which were reported by CARRASQUILLO in 1938. This species has certain affinities with three previously described as causative of human disease namely *C. griseum* Gougerot 1933 *C. recises* Leão and Lobo 1934 and *C. keratoplasticum* Morikawa, 1939. The present differs from all of these, but the author has not yet given it a name. H H S

MOORE (Morris) & MAPOTHER (Paul) Chromomycosis of the Face. Report of a Case and a Study of the Causative Organism, *Phialophora verrucosa*—*Arch Dermat & Syph* 1940 Jan Vol. 41 No. 1 pp 42-54 With 4 figs. [24 refs.]

- DE ALMEIDA (F) Observações sobre culturas de *Paracoccidioides cerebriformis* Moore 1935 Nota I. [Notes on Cultures of *Paracoccidioides cerebriformis* Moore, 1935].—*Ann. Facul. de Med. Univ. de S. Paulo* 1935. Vol. 14 pp. 235-245 With 3 plates (2 coloured) English summary

A fungus cultivated from cases of blastomycosis in Brazil has been maintained at the Oswaldo Cruz Institute under the designation *Coccidioides histoporo-cellularis* MOORE made a study of this and concluded that it belonged to the genus *Paracoccidioides* and [for reasons not mentioned in the present paper] gave it a new specific name *cerebriformis*. In its growth it was observed to produce at times a red pigment which disappeared as the culture aged, and later cultures were white and two different types of culture were produced one, deeply furrowed, easily detachable from the medium (Sabouraud glucose) and readily dissociating the other with larger folds covered with light down, more adherent to the medium Both types may produce red pigmentation in the early days of cultivation. The coloured plates show the culture characters very clearly H H S

- DE ALMEIDA (F) Granuloma paracoccidioidico—Sua distribuição no Brasil e particularmente em São Paulo [The Distribution of Paracoccidioides Granuloma in São Paulo, Brazil].—*Ann. Facul. de Med. Univ. de S. Paulo* 1936 Vol. 12 No. 3 pp. 403-405 With 7 graphs.

The south American, Brazilian, form of fungus producing blastomycosis, *Paracoccidioides brasiliensis* differs in many respects from the *Coccidioides immitis* the cause of analogous lesions in north America MORRIS MOORE on studying the latter condition found that there were two species, *Paracoccidioides brasiliensis* and another which he named *P. cerebriformis* [see above] As regards distribution of cases, of 370 observed to the end of December 1935 nearly two-thirds, 240 (65 per cent) occurred in São Paulo Rio came next, but far behind, with between 30 and 40 [the graph is not very clear], 30 were not allocated, and the remaining 60-65 were divided among nine other States. Other graphs give the nationalities of those affected [as the relative populations by race are not stated, this graph conveys no useful information] the ages most affected were between 20 and 30 years, those between 40 and 50 next, and 30-40 years a close third 83 per cent. of the patients were males The disease seems to be on the increase of late years there have been about 30 cases annually recorded in São Paulo alone H H S

- LAMPE (P. H. J.) Over paedra en het vóórkomen van paedra te Batavia. [Piedra in Batavia].—*Geneesk. Tijdschr. v. Nederl. Indië* 1940. June 18. Vol. 80 No. 25. pp. 1519-1525 With 12 figs. on 4 plates. English summary

"Piedra with black nodules, caused by *paedraia*, is frequently met in the native population of Batavia 120 men and 66 women were examined out of whom 40 and 3 were infected, viz. 33 and 5 per cent. On the other hand, *paedra* with less coloured or white nodules, caused by *trichosporum*, seems very rare only one case was seen.

"No evidence was found of a direct transmission but a high incidence was observed in men who take their baths in public waters and the same was true for the use of a certain hair-oil locally made in a Chinese factory. Whether these coincidences are real and significant in connection with the cause or the manifestation of the disease is yet to be decided.

CATANHI (A.) Sur la répartition de différentes espèces de champignons des teignes de l'homme en Afrique. [The Distribution of Pathogenic Skin Fungi in Africa.]—*Arch Inst. Pasteur d'Algérie* 1939 Dec. Vol 17 No 4 pp 613-624 [40 refs.]

PANJA (D) & MAPLESTONE (P A) A New Method of treating Leucoderma—*Indian Med Gaz* 1940 Feb Vol. 75 No 2. pp 83-94 With 1 plate.

The oil extracted from seeds of *Psoralea corylifolia* and known as bouchi oil has been used as an external application in leucoderma with occasional success. Recently however the authors used it by intra dermal injection with excellent results. A single drop (0.05 to 0.1 cc.) is injected at each place and may be enough in the centre of an area only 1 cm. in diameter. For larger patches the authors advise that several injections be given at one time but that they should not be too close together the intervening areas being dealt with a few days later. The injections cause considerable pain and may even produce small ulcers which if close together may coalesce to form relatively large lesions. In two or three weeks pigment begins to form at the site of the needle puncture from which point it spreads centrifugally and this process occurs even if there has been ulceration. A series of excellent illustrations indicate the good results obtained and it is stated that even in cases of long standing regeneration of pigment may be induced. The authors are now attempting to reduce the pain by the addition of various substances to the oil.

It is pointed out that in races with dark skins this condition is often regarded as leprosy and that affected persons are therefore unjustifiably shunned by their fellows

C IV

LANDOR (J V) Dermatitis Venenata from a Common Malayan Plant—*Jl Malaya Branch Brit Med Assoc* 1940 Mar Vol 3 No 4 pp 384-386 With 3 figs.

The plant referred to is *Gynandropsis gynandra* or *G. pentaphylla* known among Malays as maman puteh maman hantu or kemaman and among Tamils as velai or thair velai. It is used by some as a vegetable it is a common Malayan weed whose sap contains an irritant oil which is destroyed by cooking. The crushed fresh leaves are used as a counter irritant. In the instance here recorded the leaves were rubbed in the hands and applied to an axillary boil and a severe dermatitis soon followed. Patch test with the crushed leaves was strongly positive, with uncrushed leaf negative. The dermatitis soon cleared with rest and the application of a soothing lead lotion.

H H S

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

PRECIS OF ABSTRACTS IN THIS SECTION

Relapsing fever—NEILSON (p. 95) reports a case of relapsing fever from Oklahoma.

CAUXO (p. 97) found spirochaetes morphologically indistinguishable from *S. recurrentis* but motionless, in the urine of 27 patients (from a total of 41 examined) in whom spirochaetes were present in the blood. Six specimens were inoculated into squirrels and in one case relapsing fever was induced, showing that in this patient at least the spirochaetes were living and virulent.

ONG (p. 97) has found that if *S. duttoni* is inoculated into fowl embryo two or three days before hatching infection is readily produced. Spirochaetes are present in the blood of the chicks which emerge and may persist for 5 days. Normal chicks and adult fowls are immune to infection, but no reason has been found for the susceptibility of the embryos and the immunity of the hatched fowls.

KUHN (p. 97) have cultivated *Trypanosoma brucei* and *Spirochaeta recurrentis* in fowl embryos. With the latter embryos which had been incubated for 9 to 12 days at the time of inoculation regularly died between the third and fifth days after inoculation.

HOMERUS and CHICKLEY (p. 96) have investigated the value of insecticides against *Ornithodoros moubati* in natural surroundings. Fumigation even with HCN is useless. A mixture of turpentine alcohol, kerosene and soap was the most effective spray but is expensive. Parachlorobenzene in kerosene gives excellent results, although it cannot eradicate ticks from thatch. It is effective against bed bugs and cockroaches. For blanket and bedding the Camille disinfectant in which a temperature of 82°C. may be attained, is efficient.

SCHUBART (p. 99) has devised a receptacle for the propagation of spirochaete-infected *Ornithodoros faricata*.

Leptospirosis—ESSEVELD et al. (p. 99) have examined a large number of animals in the Dutch East Indies and have found that rats form the most important reservoirs of leptospires, but that cats weighing over 1.5 kgm. are also considerably affected. The principal strains are *L. javanica* and *L. balcanica* but in man the latter predominates. The presence of *L. canicola* infection in man has not yet, however, been excluded.

Rat-bite fever—DÍAZ ARTILES (p. 101) reports the third recorded case of rat-bite fever in Porto Rico but suspects a higher incidence. The child was successfully treated with Stovarsol.

NEILSON (W P) Med Assoc With 1 fig 1940 July 13 Report of a Case of Relapsing Fever—Jl Amer Vol 115 No 2 pp 125-129

A record of a typical case of relapsing fever in a patient from an Oklahoma farm. The origin of this infection is obscure since there was no history of insect bite or other external lesion, and the patient lived in the wheat plains area and did no outside work. No other cases were found in the neighbourhood.

C IV

E Hindle.

CHUNG (Huei Lan) Presence of *Spirochaeta recurrentis* in the Urine of Patients suffering from the Chinese Strain of Relapsing Fever — *Far Eastern Assoc Trop Med C R Dixième Congrès Hanoi* 26 Nov-2 Dec 1938 Vol. 2. pp 309-314

More than ten years ago REMLINGER and BAILLY showed that the urine of guineapigs experimentally infected with *Sp. hispanica* might contain the organism during the height of the infection. In order to determine whether the same might hold good for human beings naturally infected with *Sp. recurrentis* the author examined the urine carefully collected, from 41 patients in whose blood the spirochaete was seen. Ten cc. of urine were centrifuged at 2 000-2 500 r.p.m. for 20 minutes and all but 0.1-0.2 cc pipetted off from the deposit which latter was examined by dark field illumination. In 27 of the patients spirochaetes morphologically indistinguishable from *Sp. recurrentis* were seen but they were motionless. In one case they were present in large numbers during the crisis but not during the remission. Six specimens were inoculated into six squirrels 4 died in 7-11 days apparently of septic pyogenic infection one developed relapsing fever in 18 days. The question whether these urinary spirochaetes were merely saprophytes in the genitalia is considered although morphologically they were indistinguishable from *Sp. recurrentis* in one case certainly living and virulent relapsing fever spirochaetes were present. H H S

OAG (R. Knight) The Comparative Susceptibility of the Chick Embryo and the Chick to Infection with *Borrelia duttoni* — *Jl Path & Bact* 1940 July Vol. 51 No. 1 pp 127-136 With 1 plate

A continuation of the author's observations on the growth of *Spirochaeta duttoni* in fowl embryos and young chicks. [See this *Bulletin* 1940 Vol. 37 p 200]

The developing fowl embryo is found to be extremely susceptible to infection with this spirochaete if inoculated 2 or 3 days before hatching and the chicks which emerge show numerous spirochaetes in their blood which may persist for as long as 5 days after hatching.

Normal chicks even newly hatched as well as adult fowls are found to be solidly immune to infection with *S. duttoni* inoculated intra-venously subcutaneously or intraperitoneally. The whole blood and serum from mouse fowl or fowl embryo are spirochaetocidal *in vitro* possibly producing a direct lytic effect but this property seems to be absent from the blood of the mouse and fowl embryo *in vivo*.

The temperature of the chick (40°C.) although higher than the optimum for a spirochaete normally parasitic in man and certain other mammals seems to have no influence on resistance to *S. duttoni*.

No explanation of the difference in susceptibility of the fowl embryo and the young chick has yet been found. E H

HALLAUER (C.) & KUHN (H.) Ueber die Dauerzüchtung von Nagana trypanosomen und Rückfallfieberspirochäten im befruchteten Hühnerei. [The Cultivation of Nagana Trypanosomes and Relapsing Fever Spirochaetes in Incubated Fowl Eggs.] — *Ztschr f Hyg u Infektionskr* 1940 Apr 7 Vol. 122. No. 4 pp 406-411 With 5 figs

Trypanosoma brucei and a European strain of *Spirochaeta recurrentis* were inoculated in the usual way into fowl's eggs that had been incubated 9 to 12 days.

The trypanosomes appeared in the blood within 2 to 3 days and usually caused the death of the embryo within 5 days. Subcultures into other eggs are best made on the 4th day and in this way the authors maintained the trypanosomes in eggs for 22 successive passages during a period of 2½ months. After 10 to 12 passages the trypanosomes regularly showed two distinct forms, one short and thick and the other long and slender. This dimorphism disappeared in later passages and also when the egg strain was inoculated into mice the typically monomorphic character of the trypanosome being restored. No alteration in virulence to mice and guinea-pigs was noted as a result of the egg passages.

The culture of a European strain of *Spirochaeta recurrentis* was effected in a similar manner in eggs that had been incubated for 9 to 12 days. Two to three days after being inoculated the blood of the embryos contained numerous spirochaetes and the embryos regularly died of the infection between the third and fifth days. The strain was maintained continuously in developing eggs for 35 passages extending over more than 4 months without any alteration in virulence being observed.

E H

HOPKINS (G. H. E.) & CHORLEY (T. W.) Experiments on the Destruction of Ticks.—*East African Med. J.* 1940 May Vol. 17 No. 2. pp. 71-80

Fumigation by sulphur dioxide or HCN appeared to cause no inconvenience to *Ornithodoros moubata* even when the ticks were exposed in an open vessel to the gases. Experiments with sprays were therefore undertaken, the ticks being placed in Petri dishes in cracks in model walls, or under natural surroundings in native prisons. Several substances showed some killing effect, including kerosene, formalin and turpentine, but only the latter was successful enough to warrant further trial. It was found that the diluents used, kerosene or alcohol, diminished the killing time of turpentine, but the addition of a little soap to such mixtures greatly increased the killing power. The final mixture selected consisted of 30 cc. turpentine, 50 cc. 25 per cent. alcohol, 5 cc. kerosene and a little white soap. This killed ticks in a few minutes, but was expensive and troublesome to make. Attention was therefore turned to a solution of 1½ lbs. paradichlorobenzene in 1 gallon kerosene roughly filtered to avoid blocking of the jet of the sprayer. This gave excellent results with the Petri dishes and model walls. In actual buildings the results were good especially if ceilings were present—the spray cannot eradicate ticks from thatch. The amount used was about 12-14 gallons to 2,000 square feet of surface sprayed and the cost, exclusive of labour was about 2s. 4½d per gallon. It is pointed out that the spray should be fairly coarse and under considerable pressure—a fine mist is not successful. This spray is apparently effective against *Cimex lectularius* and its eggs, and against cockroaches.

To kill ticks in blankets, bedding and clothing the Carnie disinfectant was found to be efficient. This consists of large open-mesh basket inverted over a small charcoal or dung fire—over this are placed the blankets, etc. and these in turn are covered by a still larger close-mesh basket plastered with cow dung. In this a temperature of 82°C. may be reached, and the articles should be exposed for ½ hour.

C II

SCHUHARDT (V T) A "Tiektorium" for the Propagation of a Colony of Infected *Ornithodoros turicata*—*Jl Parasitology* 1940 June Vol. 26 No 3 pp 201-206 With 4 figs on 1 plate.

A description of the construction and maintenance of a receptacle for the propagation of a spirochaete-infected colony of *Ornithodoros turicata* and methods of exposing animals to infection

A cave near Falls Creek Texas served as a source of these ticks for some years but in 1936 an irrigation scheme on the Colorado River resulted in its inundation. Several hundred ticks were collected before this took place and since that time they have been successfully maintained in this housing device for details of which the original article should be consulted. E H

ESSEVELD (H) COLLIER (W A.) & MOCHTAR (A) Leptospirosis in the Netherlands East Indies, with Special Reference to the Virus-reservoirs (Report presented at the Sixth Pacific Science Congress San Francisco 1939)—*Meded Dienst d Volksgezondheid in Nederl Indië* 1940 Vol. 29 No 1/2 pp 1-9

A useful study of leptospirosis in the Netherlands East Indies based on the examination of more than 3 000 animals from Batavia and its neighbourhood with special reference to determining the reservoirs of infection.

The animals were examined by making cultures from the kidneys and the results of tests of rodents and carnivora are shown in the table on the following page.

In addition 113 *Crocidura* sp and 276 bats belonging to different species were examined with negative results.

It is evident from this table that rats of various species are the most important reservoirs Of the strains from *Rattus rattus* 165 were determined serologically 164 belonged to *L. javanica* and only one to *L. bataviae* Collier has extended the examination of these animals mainly from the suburbs and found about 50 per cent infected. Out of 185 strains from Norwegian rats 115 were identified 100 belonged to the *bataviae* and 15 to the *javanica* type.

It will be noticed that 116 cats weighing less than 1.5 kgm were uniformly negative but 13 strains were isolated from 233 cats above this weight Seven of the strains belonged to the *bataviae* and 6 to the *javanica* type.

The various strains were tested serologically by means of various specific antisera against known types and all the strains were found to be either *L. bataviae* or *L. javanica* With a typical anti Weil serum (Wijnberg) the *L. javanica* strains reacted slightly up to 1/250 dilution. Also a few slight coagglutinations were observed Guinea pigs inoculated with *L. bataviae* regularly became infected and died with symptoms of jaundice and haemorrhage On the other hand guinea pigs inoculated with *L. javanica* never showed any typical signs of disease and although in one series some of them died the cause of death was uncertain.

Guinea pigs occasionally showed *L. javanica* in the kidneys three weeks after inoculation but white mice were found to be much more regular carriers of the infection.

Order	Species of animal	No of animals examined	Media from the kidneys after 3 weeks		Percentage of leptospirae-carriers
			sterile	leptospirae	
Rodentia	<i>Rattus rattus</i> <i>beccardatus</i> Horst & de R. (field rat)	1 042,	808	174	16.7
	<i>Rattus rattus diardii</i> Jent (house rat)	80	64	2	2.5
	<i>Rattus rattus</i> spec	165	148	17	10.3
	<i>Rattus norvegicus</i> Erxl. (Norwegian rat)	15	6	9	(60)
	White tame rats from the Enkman Institute	57	57	0	0
	<i>Sciurus notatus notatus</i> Bodd. (squirrel)	172	172	0	0
	<i>Chirotopomys glirivulus</i> avian Thos. & Wt. (small coconut rat)	127	127	0	0
Carnivora	<i>Felis domestica</i> L. (house cat) under 1.5 kg body weight	116	116	0	0
	<i>Felis domestica</i> L. (house cat) over 1.5 kg body weight	233	220	13	5.6
	<i>Felis bengalensis jayacensis</i> Deam (tiger cat)	6	6	0	
	<i>Procyon lotor</i> (raccoon)	12	12	0	
	<i>Paradoxurus hermaphrodites jayacensis</i> Hoad	17	17	0	
	<i>Herpestes jayacensis jayacensis</i> Deam	7	6	1	
	<i>Lutra crassa</i> Illig (common otter)	6	6	0	

The examination of 673 samples of human sera, mainly from the town of Batavia, against 5 strains of leptospira gave the following results —

Type	No. of sera examined	Negative	Positive
<i>L. bataviae</i>	617	573	44 (7.1 per cent)
<i>L. jayacensis</i>	463	464	4 (0.8 per cent)
<i>L. sci herm.</i>	617	617	0
Rachmat	501	499	2 (0.4 per cent.)
" Salunem	223	223	0

It would seem from these results that *L. bataviae* and *L. jayacensis* are the two most important strains in Batavia, but the possibility of *L. canicola* being present has not yet been excluded. E H

DIAZ ATILES (Alberto) *Sodoku Its Present Status. Report of a Case, Suggested Oral Treatment in Infants and Young Children.*—*Bol Asoc Med de Puerto Rico* 1940 Aug Vol. 32 No 8 pp 293-302 With 2 figs [18 refs.]

A general account of the disease followed by the report of a case in Porto Rico in a 9 months old baby who had been bitten by a rat

Spirilla were discovered in stained blood-smears of the patient and the organism was also recovered from the peritoneal fluid and blood of rats and guinea-pigs inoculated with the patient's blood. The clinical symptoms were typical and the case was treated successfully by oral doses of acetarsones (Stovarsol). There are only two previous records of the disease from Porto Rico but under the existing living conditions the author suspects a higher incidence E H

MALARIA.

PRECIS OF ABSTRACTS IN THIS SECTION

HACKETT (p 102) points out certain factors in the epidemiology of malaria about which more information based possibly upon new techniques of investigation is necessary

From hospital figures it appears that there has been increased incidence of malaria in the Federated Malay States in recent years and the Malaria Advisory Board (p 102) attribute this in large measure to the replanting of rubber. Drug prophylaxis with plasmoquine was unsuccessful in one experiment but in another M3 is being tried. Other measures of control are reported. ROBERTSON (p 103) shows that malaria has become more prevalent in the province of Hunan as a result of movements of population occasioned by war conditions. *A. hyrcanus* var *sinensis* and *A. minimus* are the principal vectors.

PAHATI (p 104) discusses the malaria found in the island of Tahiti as there are no vectors all the cases were contracted on the adjoining mainland. AMBLALET (p 104) from an investigation in Algeria shows how disastrous may be the consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small [see also TATE below]

AFRIDI *et al* (p 105) have studied adult *A. culicifacies* near Karnal in India.

HU (p 105) shows that near Shanghai, *A. hyrcanus* var *sinensis* is found much more frequently in animal sheds than in adjacent human habitations

TATE (p 105) relates how a dam in Alabama created a favourable breeding place for *A. quadrimaculatus* with the result that there occurred an epidemic of malaria in a neighbouring town. Oiling of the water edge failed to give protection but relief was given by atabrin prophylaxis. KOMP (p 106) reports the finding of *A. darlingi* in British Honduras and Guatemala far north of the places in which it has hitherto been seen. BOYD and JOBBINS (p 106) found that *A. albimanus* from Panama was less susceptible to infection with strains of *P. falciparum* from Mexico or Florida than was *A. quadrimaculatus* from Florida.

CHUNG *et al.* (p. 106) describe 22 cases of subtertian malaria contracted from contaminated syringes or needles used for intravenous administration of heroin or morphine in Peiping. In performing the injection blood is drawn into the syringe and no attempt at sterilization is made. Tertian malaria is the type usually acquired in nature in this district.

NUCCIOTTI (p. 107) has developed a method of administering adrenalin (in the form of a preparation, Sorrenasi, described in the abstract) together with quinine in the early stages of infection. The results are claimed to be good and the method is easier than the original Ascoli method.

In Malaya FIELD and NIVEN (p. 107) from a considerable series of experiments on immigrant Indian labourers, have found that in persons who have received prophylactic drugs, the incidence of malaria after the cessation of administration is very much higher than in untreated controls. This phenomenon is probably due to failure of the treated persons to acquire immunity during the period of drug prophylaxis. FARINAUD (p. 108) shows that in French Indo-China if the breeding of the principal vectors is not controlled, drug prophylaxis cannot confer complete or lasting benefit, but if there is some premunition and some control of anophelines the synthetic drugs may be of great value. Quinacrine is the essential drug.

C IV

HACKETT (L. W.) Some Obscure Factors in the Epidemiology of Malaria.—*Amer. J. Public Health*, 1940 June. Vol. 30 No. 6 pp. 589-594. Also in *Med. Officer* 1940 Aug. 3. Vol. 64 No. 5. pp. 37-39.

The title of this paper defines its scope and intent. There are influences at work favouring or hindering malaria transmission of which little account is, or can be, taken in malaria surveys—new techniques are required. Such influences may upset calculations based on measurable factors. The relative susceptibility to malaria infection of anopheline vectors, the measure of the contact of the anopheline with man, and the life-span of the anopheline vector in its natural environment are among the influences directly concerning the insect vector about which knowledge is required. With regard to the population at risk, group immunology as determined by the multiplicity of malaria strains, and the possibility that gametocytes may appear in waves in a large number of people simultaneously in response to some natural external stimulus, are matters about which further knowledge is required.

Norman White

FEDERATED MALAY STATES. Annual Report of the Malaria Advisory Board for the Year 1939 [KINGSBURY (A. Neave) Chairman]—22 pp. With 4 charts. 1940 Kuala Lumpur F.M.S. Govt. Press.

As in previous years, admissions to hospitals are the only data available for estimating malaria incidence. Such figures have obvious limitations. Hospital admissions for malaria in 1939 in the Federated Malay States numbered 49,700 as compared with 51,300 in 1938, 35,800 in 1937 and 27,200 in 1936. In 1938 all four States had escaped

the autumn wave and, probably as a result the usual April-June wave in 1939 was less severe than in the previous year. Exceptionally high autumn waves developed however and accounted for the year's high total of cases in Selangor and Pahang the autumn maxima exceeded those of May-June. Such heavy autumn waves have not been experienced for many years. Much of the increased incidence during the past three years is ascribed to the replanting of rubber [see also this *Bulletin* 1940 Vol. 37 p 454] the acreage replanted in 1939 was twice that of the previous year. The case mortality rate remained stationary at 1.8 per cent. a satisfactory figure. There were 47 cases and 12 deaths ascribed to blackwater fever as compared with 37 and 9 in the previous year.

An attempt at plasmoquine prophylaxis was carried out on an isolated estate with a population of about 700. The administration of 0.02 gm. (adult dose) of plasmoquine twice a week was continued throughout a year. The attempt was not successful.

An attempt at prophylaxis with M.3 prepared in the State Biochemical Institute of Milan is in progress. Two and a half months after the commencement of treatment there was no appreciable reduction of malaria incidence in a group of persons so treated. [M.3 is manganese iodo-mercurate in association with spleen extract see this *Bulletin* 1938 Vol. 35 p 31 and 1939 Vol. 36 p 262.]

Field experiments with various anti-larval oils continue. On one estate rubber oil, distilled from scrap rubber has been used as a larvicide with success. Recent experience with fascine drainage has been very encouraging. The time of survival of the timber used for the packing is very long. Experiments have been carried out with automatic traps for adult mosquitoes. In one type of trap mosquitoes are drawn by suction against a wire gauze. In the other they are drawn through the fan into a killing bottle. For the lights green blue was found to be the best colour. Red was unsatisfactory. The results were good with the former.

The report contains an interesting note on the haemoglobin percentage of rural Malay and Tamil children. Though malaria and helminthiasis both contribute to the low average haemoglobin sub-nutrition is a most important factor in the causation of anaemia.

N W

ROBERTSON (R. Cecil) *Malaria in Hunan Province.—Far Eastern Assoc Trop Med C R. Dixième Congrès Hanoi 26 Nov-3 Dec 1938* Vol. 2. pp 917-940

This malaria survey of parts of Hunan was carried out as a prelude to repopulating the region with refugee farmers from other parts of China. Malaria does not appear to have been a serious cause of morbidity or death until comparatively recently. Communist incursions during the civil war brought with them strains of malaria infections, as did subsequently labour gangs employed on the construction of new highways and railroads. Still more important are the migrations of the civil population and the passage of troops from every province occasioned by the war with Japan. The author anticipates an increasing epidemicity of malaria in this and many other parts of China. His report shows the disease to be firmly entrenched as an endemic in those parts of the province he has studied.

In the north-east corner of Hunan 914 blood films were examined. Malaria parasites were found in 63. 40 of these contained *P. malariae*.

and 15 *P. vivax*. Further south *P. falciparum* is most in evidence. *A. kyzicus* var *sicensis* is the most prevalent anopheline and almost certainly the most important vector. In south-western Hunan *A. minimus* and *A. maculatus* were found in hilly regions; the former here plays an important part in the spread of malaria. *A. ludlowi* was also found but it was rare.

N IV

PANATH (Amador P) The Epidemiology of Malaria in a Non-Malarious Barrio of Talim Island.—*Acta Med Philippina* Manila 1939 July-Sept Vol 1 No 1 pp 37-46. With 2 maps & 1 chart

Talim Island, a small island in Laguna Bay is non-malarious; no malaria vectors have been found there. The barrio of Talim is on the southern tip of the island. It has a population of 913. During the latter half of 1938 there were 199 cases of benign tertian malaria. The victims had all contracted infection on the adjacent mainland where they were engaged in seasonal agricultural pursuits. The part of Rizal Province where infection was contracted is not usually malarious though *A. minimus* var *flavescens* is prevalent. In 1938 the visit of malaria carriers from Laguna Province introduced infection.

N IV

AMBIALET (R) Quelques observations parasitologiques sur une épidémie de paludisme (R'Oufi, Département de Constantine septembre 1938). Parasitological Observations on an Epidemic of Malaria in R'Oufi, Department of Constantine, Algeria, in September 1938.—*Arch Inst Pasteur d'Algérie* 1940 Mar Vol 18 No 1 pp 19-28.

R Oufi was the scene of comparative experiments in mass prophylaxis by means of quinine and of synthetic drugs that were carried out in 1934-36 [see this Bulletin 1938, Vol. 35 pp 422-424]. Malaria in R Oufi is dependent upon the vagaries of the Oued el Abiodh and the value of the observations on mass prophylaxis was somewhat vitiated by the fact that there were practically no anophelines and no malaria transmission during the whole period of the observations. There were residual infections whose evolutions were the subject of an interesting study. In 1938 a severe epidemic of malaria afflicted R Oufi. The author passing through the place in September of that year took the opportunity of examining the blood of all the children of one village and of some children and adults met on the road. The number of persons so examined was 44 and the results of this examination are recorded. The parasite index of this small group was 65.9 per cent as contrasted with 0.72 in May 1936 at the completion of the prophylaxis experiment. *P. falciparum* was proportionally much more prevalent than it had been during the previous observations, and the increase in the proportion of the infected persons who were gametocyte carriers was very much greater in the case of *P. falciparum* than of *P. vivax* and of *P. malariae* infections. The observations illustrate the disastrous consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small.

N IV

COLLIGNON (E) Remarques sur le comportement des anophèles en Algérie pendant l'année 1939 [Anopheles in Algeria in 1939]—*Arch Inst Pasteur d'Algérie* 1940 Mar Vol 18. No 1 pp 29-37 With 8 figs. on 4 plates

AFRIDI (M K.) & PURI (I M) Studies on the Behaviour of Adult *Anopheles culicifacies* Part I. Review of Literature—*Jl Malaria Inst of India* 1940 June Vol. 3 No 1 pp 1-22. With 1 plate. [116 refs]
— MAJID (Abdul) & SHAH (Imdad Ali) Studies on the Behaviour of Adult *Anopheles culicifacies* Part II.—*Ibid* pp 23-51 With 1 map & 5 charts. [16 refs.]

In the first paper the authors summarize existing knowledge about this mosquito. They appear to have gathered together all that is known about its seasonal prevalence resting and feeding habits hibernation and aestivation longevity and range of flight. This paper will be a most useful foundation for future work. In the second paper the authors describe their own work carried out near Karnal. The area was conveniently accessible but was open to me objection that larvae were continually drifting in down a canal, so that the population under study is not by any means a simple one. The main objects of the study have been the relative numbers of adults at different seasons and the proportions of young and aged adults. The authors have made use of simple methods of observation and have carried out relatively few experiments. They publish their data fully for which the reader may be grateful, for he is provided with a large amount of original material from which to draw his own conclusions. At the same time it might be felt that the men most likely to draw useful conclusions are those who did the work and that perhaps the authors should have been bolder in stating their own views.

P A Buxton

HU (S M K.) Observations on the Zoophilism of *Anopheles hyrcanus* var *sincensis* Wied. in the Shanghai Region.—*Far Eastern Assoc Trop Med C R Dixième Congrès Hanoi* 26 Nov-2 Dec 1938 Vol. 2. pp 873-888. With 6 figs on 3 plates & 2 diagrams

Observations made in 1934-35 in the Kaochiao district near Shanghai are recorded in detail. They show that *A. hyrcanus* var *sincensis* the local malaria vector is found in very much greater numbers in cow sheds pigsties and goat stables than in adjacent human habitations [see TOUMANOFF & HU this *Bulletin* 1935 Vol 32 p 437 and 1936 Vol 33 p 849 and TOUMANOFF & CANET this *Bulletin* 1940 Vol 37 p 860]

TATE (Guy M.) Controlling a Malaria Epidemic at Maxine, Ala.—*Amer Jl Public Health* 1940 June. Vol. 30 No 6 pp 675-679

This is an account of a malaria epidemic in a community of about 240 persons resulting from the heightening of a dam to secure a deeper channel for navigation. As a result the Coal Creek area about 40 acres in extent is submerged, the depth of water varying from a few inches to several feet. It is covered with vegetation. It

is now a prolific breeding place for *A. quadrimaculatus*. Spraying parts of the shoreline with oil failed to protect the nearby community of Maximo a severe epidemic of tertian malaria ensued. The prophylactic issue of atabrin twice a week from June 15 to Sept 7 gave relief clinical cases during this period were few. Adults received 0.2 gm twice weekly smaller doses were given to children. A month after the cessation of treatment only 2.6 per cent. of blood smears harboured parasites. N IV

VARGAS (Luis) Clave para identificar las hembras de Anopheles Mexicanos [Key to the Female Mexican Anopheles].—Rev Inst de Salubridad y Enfermedades Tropicales Mexico 1940 May Vol. 1 No 2 pp 199-203

HOWE (W H W) The Occurrence of *Anopheles darlingi* Root in British Honduras and Guatemala.—Public Health Rep 1940 Apr 19 Vol 55 No. 16 pp. 683-694 Also in Science 1940 May 31 Vol. 91 No 2370 pp. 522-523.

A. darlingi a very potent malaria vector in Brazil, has hitherto not been found north of British Guiana and Venezuela. The author now reports the finding of larvae and pupae of this species in pool alongside a creek in British Honduras. Adults were also captured in bed nets of the camp personnel none were captured with horse bait. Six adult female *A. darlingi* have also been found among a collection of mosquitoes from Guatemala these were caught at Panzós a town some 80 miles west of Puerto Barrios on the Atlantic coast of Guatemala. The finding of this species so far north of its usual range of distribution is of interest. N IV

BOYD (Mark F) & JOHNSON (Daniel M) Further Observations on the Comparative Susceptibility of *Plasmodium falciparum* and Neotropical Anophelines to Coindigenous Strains of *Plasmodium falciparum*.—Amer J Trop Med 1940 May Vol. 20 No 3 pp 423-429

Previous work on this subject by Boyd and his colleagues has been noted in this Bulletin (1938, Vol 35 p 659 1940 Vol 37 p 288]. The observations now recorded are essentially similar. *A. albimanus* from Panama has been compared with a Florida strain of *A. quadrimaculatus* with regard to susceptibility to infection with strains of *P. falciparum* coming from Florida, Mexico and Panama respectively. *A. albimanus* is definitely less susceptible to infection with strains from both Florida and Mexico than is *A. quadrimaculatus*. The relative susceptibility of the two Anopheles strains to infection with *P. falciparum* from Panama present no significant difference. N IV

CHUNG (Huei-Lan) CHU (Irving) & WANG (C W) Syringe Transmission of Subtertian Malaria among Harbored Adults in Peking (A Résumé of 23 Epidemic Cases).—Far Eastern Assoc Trop Med. C R. Durban Congrès Hanoï 20 Nov-3 Dec 1938 Vol. 2 pp. 913-918.

Between November 1937 and April, 1938 a mosquito-free season in Peking 24 patients suffering from malaria were seen in the Union

Medical College Hospital in that city. Of these two were suffering from relapses of tertian malaria the remaining 22 were subtertian infections contracted almost certainly by means of contaminated syringes and needles used for the intravenous injections of heroin or morphine. Tertian malaria is the most common form of the disease naturally acquired in Peiping during the period in question no fresh infections of tertian malaria were seen. Twenty-one of the patients were natives of Hopei in which province naturally acquired subtertian malaria is very rare. 18 had never been outside this province. All 22 patients were narcotic drug addicts who had been receiving from 2 to 5 intravenous injections of heroin or of morphine daily. In the narcotic dens incriminated no attempts at cleaning the syringe or needle were made after their use before a subsequent addict received his injection. In making the injection about half a cc of the victim's blood was drawn into the syringe containing the narcotic solution and blood and solution were then injected together. In all these cases the malaria infections were very severe all but one suffered from severe anaemia. One patient died in the others quinine sometimes associated with plasmoquine suppressed the malaria. [See also this *Bulletin* 1935 Vol. 32 pp 108 109 (list of other references given) 405 1937 Vol. 34 p 174 1939 Vol. 36 p 10]

N H

NUCCIOTTI (Leonello) Azione della terapia adrenalina in dosi minime uniformi nella malaria recente [Adrenalin in Small Doses in Recently Acquired Malaria.]—*Polisidico* Sez Prat 1940 May 20 Vol. 47 No 20 pp 854 857-8 861

The author is impressed by the benefits conferred by associating Ascoli's adrenalin treatment with the administration of quinine in the treatment of recently acquired malaria with respect to the marked improvement in the patient's general condition and to the diminished number of relapses that result from such association. He accordingly tried to evolve a method of administering adrenalin easier of application on a large scale than is Ascoli's method with its progressively increasing dosage. He has found that the intravenous injection of 1/100 mgm. of Surrenasal [apparently an extract of whole adrenal gland containing adrenalin cortical hormone and Vitamin C] daily for six days followed by the daily injection of 1/50 mgm. for the succeeding six days and associated with quinine treatment is even more effective than is Ascoli's complete method in recently acquired infections. The total amount of adrenalin given is only 0.18 mgm. which is little more than a tenth of the amount given in Ascoli's complete course of treatment.

N W

FIELD (J W) & NIVEN (J C) Malarial Chemoprophylaxis. Field Observations on Post Prophylactic Epidemicity—*Far Eastern Assoc Trop Med C R. Dixième Congrès Hanoï* 26 Nov-2 Dec 1938 Vol. 2. pp 859-893 With 11 graphs & 3 diagrams.

The authors in association with HODGKIN have previously reported the results of field experiments carried out in plantations in Selangor Malaya on the value of atebm and quinine as clinical prophylactics.

(114)

of malaria [see this *Bulletin* 1938, Vol. 35 p. 36]. In that report attention was directed to the rapid reappearance of clinical malaria which followed the suspension of the administration of the prophylactic drugs. The present report is concerned exclusively with this phenomenon. The seven experiments described were made on 2,500 immigrant Indian labourers who were observed continuously for varying periods up to three years. In all seven experiments the post prophylactic malaria incidence among those who had received the drugs was very much higher than the incidence among untreated controls in five experiments the incidence during the month following the cessation of treatment in the treated group was more than double that in the control group. The administration of the drugs was stopped at different times of the year in some experiments during a season of normally slight transmission, when sporozoite rates were low. These post prophylactic cases were either delayed primary attacks from infections contracted during prophylaxis or else infections contracted twelve months, or more previously that had been kept latent by the administration of drugs. The severity of these post prophylactic cases, as gauged by the concentration of parasites in the peripheral blood was no greater than that of cases occurring currently among the control groups. The populations concerned were not static and the post prophylactic rise in malaria incidence was almost limited to unsalted newcomers. It is probable therefore that the rise is a phenomenon related to lack of acquired immunity and that effective chemoprophylaxis, continued for twelve months under conditions of hyperendemic malaria is not consistent with the acquisition during this period of any effective malarial immunity.

N II

FARNAUD (M. E.) La prophylaxie du paludisme par les médicaments synthétiques en Indochine. [Prevention of Malaria with Synthetic Drugs in Indo-China.]—*Far Eastern Assoc. Trop. Med. C R Dixième Congrès Hanoi 28 Nov.-2 Dec., 1938* Vol. 2. pp 890-1014 With 7 charts.

In this paper the author summarizes the lessons learnt from the very numerous attempts that have been made in varied conditions to control malaria by the administration of synthetic drugs in French Indo-China. Most if not all, of these attempts have been described in the literature and the results summarized in this *Bulletin*. It has been found that if the breeding of the principal vectors, notably *A. sinensis* is not controlled, either naturally or by antilarval measures, in hyperendemic areas, chemoprophylaxis cannot confer complete or lasting benefit. If however the population concerned possess a certain degree of premunity or if the anopheline density be reduced either naturally or as the result of antimosquito measures, the prophylactic administration of synthetic drugs may give results of great value. It is the best method of dealing with sudden increases in malaria morbidity in areas of sporadic or epidemic malaria. Quinaerine is the essential element of this prophylactic treatment. The addition of gametocides does not add appreciably to its efficacy.

A II

HELMINTHIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

General—TALIAFERRO (p 110) has reviewed modern knowledge of immunity to parasitic worms and concludes that it is essentially similar to that provoked by other infections and by non infectious antigenic agents.

Cestodes—HAIGHT and ALEXANDER (p 111) record two cases of hydatid cyst of the lungs in the United States. WILLIAMS (p 111) reports the first instance of infection with *Echinococcus granulosus* in a dog in the Szechwan province of W China.

USLENGHI (p 111) writes of the perivesicular air sac in the X ray diagnosis of hydatid cyst of the lung. ROSE and CULBERTSON (p 111) show that readily available antigens may successfully be substituted for hydatid fluid in the cutaneous test or the complement fixation reaction for the diagnosis of hydatid disease. The antigens used were from *Cysticercus pisiformis* in the rabbit and from *Taenia taeniaciformis* in the cat.

FINOCHIETTO & AGUILAR (p 112) report the operation of Posadas in hydatid cyst of the lung.

HSÜ (p 112) reports acute encephalitis as a result of cerebral cysticercosis. DOLLIGUS (p 112) names 8 species of *Railiethina* from man in tropical America. BOYNE and MEYEN (p 112) describe *Railiethina madagascarensis*. The cestode was found in a boy living in Batavia and this is the first occasion on which it has been found in the Malayan archipelago. JOYEUX and BAER (p 113) consider that *Railiethina quilensis* should be regarded as a synonym of *R. demarariensis*.

STUNKARD (p 113) shows that mites are intermediate hosts of species of *Bertiella*.

KOURI and RAPPAPORT (p 113) record 18 cases of infection with a species of *Inermicapsifer* in Cuba. All occurred in children and were easily eradicated. A description of the cestode is given.

Nematodes—MAPLESTONE and MUKERJI (p 114) have compared thymol with tetrachlorethylene as an anthelmintic. They argue that the latter used in doses of 4 cc. is safe and more efficient than thymol used in doses below 60 grains. LANE (p 114) however considers that thymol is the safest of all anthelmintics and may be used without fear in 60 grain doses in men though the dose may be reduced in women. He discusses the question and urges the need for re-examination of the whole matter.

HAHN *et al* (p 116) show that in anaemic dogs the percentage of iron absorbed decreases as the amount administered is raised, but in comment LANE points out that it is the total amount absorbed and not the proportion which matters and shows that with the larger doses the amount absorbed is greater than with the smaller doses.

BUSSMANN (p 117) points out the danger of introducing workers infected with hookworm into the German mining industry.

GALLIARD (p 117) considers that human infection with *Strongyloides* in Tonking may be more common than is suspected. He states that present methods are ineffective in the diagnosis of infection with *Strongyloides* and points out that when dogs are infected the larvae may be found in large numbers in the duodenum, but may be absent from the stools indicating digestion in the alimentary tract. LANE suggests the use of a duodenal tube in diagnosis in man.

GALLIARD (p 117) shows that in Tonking, infection of dogs and cats with *Strongyloides* is not common, probably because exposure is restricted. Worms from human sources, which have both direct and indirect cycles in man show only the indirect cycle in the dog. FAUST & DE GROOT (p 118) record the case of a boy who died as a result of a heavy infection. There was a relatively heavy invasion of the deeper layers of the bowel wall and liver by filariform larvae derived from mother worms situated in the overlying mucosa. Auto-infection by various routes is discussed and it is concluded that all infected persons are potential subjects of self-infection which however may be to some extent controlled by measures of personal hygiene.

Hsu *et al* (p 118) report two cases of heavy infection with *Ascaris*. PRINCE (p 119) reports a case of meningitis which he claims to have been due to infection with *Ascaris*. BERGER and ASENJO (p. 119) show that crystalline papain in adequate strength and over an adequate period of time digests *A. lumbricoides* *in vitro*. C F

TALLAFERRO (William H) The Mechanism of Acquired Immunity in Infections with Parasitic Worms.—*Physiol Rev* 1940. Oct. Vol. 20 No 4 pp 469-482 [122 refs]

The foregoing review of acquired immunity to the helminths is not intended to be complete, but it is designed to indicate, in the few forms that have been most thoroughly studied, the facts that have been established and the more important ideas and differences in opinion of various investigators in an actively progressing field. As has been stressed by the reviewer (1934) and others, all evidence indicates that the various immunological mechanisms operative against the helminths, both humoral and cellular are fundamentally identical with those operative against other infectious and noninfectious antigenic agents. Therefore the worms will undoubtedly be used with increasing frequency to solve those general problems in immunology for which they are best suited. Their chief advantages are connected with their large size, which makes it possible (1) to study directly the effects of the immune mechanisms on the parasite and on parasitic metabolism (2) to trace and locate the worms in the body a characteristic which is particularly helpful in studying the immune mechanism *in vivo* and the cellular reactions of the host and (3) to obtain large quantities of material, especially from the larger worms, for the preparation of antigens and for such chemical studies as the isolation of carbohydrates and enzymes.

In the specific field of helminth immunity the following points are noteworthy. The evidence so far indicates that the mechanism of immunity rests immediately on humoral factors with secondary cellular coöperation. Precipitins, which are formed by the host against various materials passing out of the mouth, anus and excretory pore of the intestinal nematodes, result in visible precipitates *in vivo* and are unquestionably of functional importance in the allergic reactions of the host. It is probable, but not proven, that the precipitins are instrumental in affecting the immobilization, delay in development, stunting, prevention of food assimilation and inhibition of enzymatic activity of the parasite. In any case humoral factors of some kind are operative. Two types of immunity, one "early" and the other "late" have been demonstrated in infections with larval tapeworms. Both can be correlated with antibodies, but whereas the antibodies of the "early" type can be absorbed with freshly ground worm material, the others cannot. Further work is necessary on the nature of the antigens to the nonabsorbable antibodies, but evidence to date indicates that they are materials liberated from the living parasite and occur if at all, in insufficient quantities in freshly ground worm material. The nature of the enzymes of parasites and the possibility

of the functional inhibition of enzymatic activity by immunological antienzymes needs further study. The evidence so far indicates that the cellular responses aside from their activity in producing antibodies, are secondary to antibody effects. The worm infections offer advantageous material for studying the local cellular reactions around parasites. They may also be used to study the effect of various factors, such as splenectomy and blockade of the macrophage system which injure the connective tissue cells and thereby affect the cellular cooperation in immunity and the formation of antibodies.

HAIGHT (Cameron) & ALEXANDER (John) *Hydatid Cysts of the Lung*
—*Arch Intern Med* 1940 Mar Vol. 65 No 3
pp 510-523 With 6 figs. [17 refs.]

Two cases of echinococcus disease of the lungs are presented and the nativity of the patients in the 46 cases of hydatid disease of the lungs and pleura reported in the North American literature is reviewed. The disease has occurred in only 5 persons known to have been born in North America.

The authors quote the following personal communications from Benjamin SCHWARTZ Chief of the Zoological Division U.S. Bureau of Animal Industry

During the fiscal year ended June 30 1938 1 513 cattle livers and 21 calf livers were condemned on account of infestation with *Echinococcus*. *Echinococcus* infestation is not rare in swine in certain sections of the United States particularly in the South. We have no difficulty in securing such material from abattoirs in Richmond, Va. We have been informed recently that *Echinococcus* in the liver of swine is fairly common in abattoirs in Nashville Tenn.

WILLIAMS (T H) *Echinococcus granulosus* in Szechwan—*Chinese Med J* 1940 Feb Vol. 57 No 2 pp 176-178

What is held to be the first report of *Echinococcus granulosus* in dog from Szechwan province of West China is here recorded. The dog appears to have been one of four examined eleven worms were found in it.
Clayton Lane

USLENGHI (José P) *Diagnóstico radiológico de los quistes hidatídicos del pulmón. A propósito del signo llamado neumomate perivascular.* [X-ray Diagnosis of Hydatid Cysts of the Lung with Reference to the Sign called Perivascular Air Sac.]—*Prensa Méd Argentina* 1940 Mar 6 Vol 27 No 10 pp 489-508 With 13 figs. [88 refs.]

The condition referred to is that in which air enters between the cyst wall proper and the adventitia. The matter of pulmonary hydatid is fully dealt with historically and the description of a case under Professor GOYENNA is given in detail with excellent X-ray plates.
C L

ROSE (Harry M.) & CULBERTSON (James T) *The Diagnosis of Echinococcus (Hydatid) Disease by Immunologic Reactions with Substitute Taenia Antigens.*—*J Amer Med Assoc* 1940 Aug 24 Vol. 115 No 8 pp 594-598 With 1 fig [17 refs.]

The antigens were made from *Cysticercus pisiformis* from the rabbit the larval form of *Taenia serrata* and from adult *T. taeniasiformis* from cats

"1 Cutaneous tests with substitute antigens were performed on fourteen patients with echinococcus disease. Complement fixation tests were made on seven patients.

"2 The group specificity of the Casoni and the Ghedini-Weinberg reactions was confirmed.

"3. Readily available antigens may be substituted for hydatid fluid in either the cutaneous test or the complement fixation reaction for the diagnosis of hydatid disease."

C L.

FLOCHETTO (Ricardo) & AGUILAR (Hernan D.) Quiste hidatídico de pulmón pleura libre. Operación de Posadas. [Hydatid Cyst of the Lung the Pleura being without Adhesions. The Operation of Posadas.]—*Prensa Med Argentina*. 1940 Mar 27 Vol 27 No 13 pp 654-657 With 6 figs.

The plastic operation of Posadas was done under local anaesthesia for a cyst in the middle lobe of the right lung. The Casoni reaction had been negative and there had been no eosinophilia. The operative pneumothorax as X ray plates show had disappeared 12 days later.

C L.

Hsu (Y K) Cerebral Cysticercosis and Acute Poliomyeloencephalitis. —*Chinese Med J* 1940 Apr Vol 57 No. 4 pp 318-329 With 8 figs on 4 plates [21 refs]

At the Peking Union Medical College *Cysticercus cellulosae* was present in the brain of 17 of 40 patients in whom the infection was detected, with epilepsy as a frequent clinical manifestation. In the case here reported there was also acute encephalitis with a diffuse inflammation throughout the central nervous system and softening attributed to functional circulatory disturbances.

C L.

DOLLfus (Robert Ph) Cestodes du genre *Raillietina* trouvés chez l'homme en Amérique intertropicale. [*Raillietina* in Man in Tropical America.]—*Ann. Parasit. Humaine et Comparée* 1939-1940 Vol 17 Nos 5 & 6 pp 415-442 542-562 With 35 figs [27 refs]

No species of *Raillietina* is known from wild or domestic mammals in tropical America. Dollfus arranges the specimens from man in 8 species, giving their characters. They are *R. (Raillietina) lochei salerei* n. sp. *R. demarensis* (Dauvel) *R. (R.) kowidoreali* n. sp. *R. (R.) equatoriensis* Dollfus, *R. (R.) guineensis* León, *R. (Fahmannella)* from Dollfus, *R. (R.) brumpti* Dollfus and *R. (R.) lunulatus* Dollfus.

C L.

BOYNE (C) & MEYER (F W) Over *Raillietina madagascariensis* (Dauvel 1869) *Tetrina madagascariensis* Dauvel 1869 *Derminea madagascariensis* Blanchard 1861 *Kollasia madagascariensis* Lopez Neyra 1831.—*Genera Tijdschr. v. Nederl. Indië* 1940 May 21 Vol 80 No. 21 pp. 1310-1318 With 7 figs. on 2 plates. English summary.

"Description of 5 specimens of *Raillietina madagascariensis* (DAUVEL 1869) found at a post-mortem of a Chinese boy 3½ years old, living at Batavia, Java. This cestode has never before been observed in the

Malayan Archipelago or at least not been recognized. No special clue with regard to the mode of infection could be discovered. Measures of certain details are tabulated and compared with those of other specimens. The rostellum was invaginated, its hooks very distinct. The suckers showed no rows of fine hooks only a fine radially directed peripheral ridging. Segmentation starts 2 mm. from the row of hooks. The segments are at first trapezium-shaped and much wider than long but the ripe ones become barrel shaped and much longer than wide. The genital pore is almost constantly unilateral but may change to the other side after 50-150 unilateral positions. Its position is in the anterior third of the segment. The cirrus-pouch does not reach the excretory system. The receptaculum seminis is very variable in shape and seems to be nothing but a passive widening of the vagina. In the stools of the other members of the child's family (father mother 3 young children) *Raillietina* eggs could not be discovered.

JOYEUX (Ch) & BAER (Jean G) *Anatomía y posición sistemática de Raillietina (Raillietina) quitensis* León 1935 cestode parásito del hombre. [Systematic Position of *R. quitensis*]—*Rev Med Trop y Parasit* Habana 1940 Mar-Apr Vol. 6 No 2, pp 79-88. With 3 figs [13 refs.]

Examination of abundant material showed variations among individuals of the same species of *Raillietina*. Accordingly *R. quitensis* León 1935 [this *Bulletin* 1939 Vol. 36 p 720] is made a synonym of *R. demarariensis* (Daniels 1895) as are the various forms described by DOLLFUS [this *Bulletin* 1940 Vol. 37 p 214] C L

STUNKARD (Horace W) *The Morphology and Life History of the Cestode, Bertella studeri*—*Amer J Trop Med* 1940 Mar Vol 20 No 2, pp 305-333 With 17 figs on 3 plates. [24 refs.]

Bertella species as do those of *Momoxia* and *Cillotaenia* utilize free-living mites as intermediate hosts for onchospheres and developing larvae were recovered from the body cavities of the mites *Notaspis coleopratus* *Scutovertex minutus* *Schedoribates laevigatus* and *Galumna* sp. and cysticercoids from *S. laevigatus* and *Galumna* sp. C L

KOURI (Pedro) with the collaboration of IRVING RAPPAPOORT *A New Human Helminthic Infection in Cuba*.—*Jl Parasitology* 1940 June Vol. 26 No 3 pp 179-181 With 8 figs

Since 1935 the authors have found in Cuba 18 human infections with a species of *Inermicapsifer* Janicki, 1910 identified by Professor BAER. It has occurred in children only has caused slight or no symptoms has been detected by passage in the faeces of proglottids which are apt to migrate to the surface of the mass. In one child segments had the mother said, been expelled continuously for six years except for an interruption of four months. The worm is easily expelled by male fern by carbon tetrachloride or even by coconut oil. BAER and STUNKARD suggest the rat as the optimum host but Kouri and Rappaport have found none in 100 rats. Its description is as follows—

It is 27-42 cm. long, possessing 310-368 proglottids. The scolex measures about 630 micra long by 610 micra broad. The suckers are about 185 micra in the broadest diameter and 150 micra deep. The neck

is roughly 3 mm. long. The proglottids in the midportion of the strobila are broader than long, approximately 2.3 by 1.5 mm. Gravid proglottids expelled in the feces measure from 3 to 3.75 mm. in length, by 1 to 2 mm. in breadth. In the living motile condition, one of the poles of the freed proglottid is often broader thus giving the segment a club shaped appearance.

Genital pores are unilateral and in the center of the margin of each mature proglottid. The cirrus pouch measures about 150 micra long by 75 micra broad. The pouch is small and runs centrally and somewhat anteriorly. The vas deferens is long and coiled both without and within the cirrus pouch. The cirrus is often seen projecting from the genital pore. Testes number from 33 to 49 per segment, the antiporal side possessing, in general, about 5 more testes than the poxal side, due to the presence of the vagina and vas deferens in the latter side. The testes average 65 by 72 micra. Gravid segments contain between 48 and 175 egg capsules. These capsules are very variable in size and shape. Each contains from 6 to 11 ova. These eggs are 55 by 49 micra and contain a small hexacanth embryo. 22 by 19 micra. Hooklets of the embryo are about 6 micra long.

C. L.

- i. MAPLESTONE (P. A.) & MUKERJI (A. K.) Comparison of Thymol and Some Other Drugs in the Treatment of Hookworm Infection.—*Indian Med. Gaz.* 1940. Apr. Vol 75 No. 4 pp. 193-200. With 2 graphs.
- ii. LANE (Clayton) Thymol as an Anthelmintic.—*Lancet* 1940 Sept. 14 p. 349.

i. "In assessing our results it may be argued that we did not use 60 grains of thymol in a single case whereas we did use 4 c.cm. of tetrachlorethylene without exception. The reason we reduced the dose of thymol was not to decry its value but we were guided by the opinion of Ashford (than whom none had wider experience in its use) that for safety the dose of thymol must be carefully regulated. We were dealing with adults, but their weight was so much below the usually-accepted normal of 150 pounds that they had to be regarded as under age from the point of view of therapeutics because this method of calculating dosage is now recognized as much more scientific than to use age in years, particularly in illiterate persons whose statement of their ages is often most unreliable. With regard to tetrachlorethylene we had our own experience of many years' use of the drug on human beings as well as our pharmacological work on cats which showed that the dose of 4 c.cm. is so far below the dangerous limit that it is not necessary to reduce the dose in adults however low their weight may be. In addition to our own experience a good deal of other evidence of the safety of tetrachlorethylene has now accumulated and so far the only case reported of its apparent dangerous toxic effects is that of Kendrick (1929) in which the serious symptoms rapidly passed off. As it is now over ten years ago since this isolated case was reported and no similar ones have since been recorded it seems reasonable to look on it as unique and of no real importance as an argument against the safety of tetrachlorethylene. Therefore we consider if the necessity for safety (stressed by Lane in the quotation given from his writings at the beginning of this paper) is accepted, as it should be, tetrachlorethylene fully comes up to his demands, as it appears to be even safer than thymol and there appears to be no doubt about its greater efficiency when the dose of thymol

is kept within the limits recommended by the greatest authority on its use

There are other factors also worthy of consideration. The cost of tetrachlorethylene is Rs. 2 per pound or less for a large quantity, whereas thymol is Rs. 7 or more a pound* and as the full dose of these drugs is practically the same the advantage of tetrachlorethylene in this respect needs no discussion. Further the sodium bicarbonate and/or the lactose and the gelatin capsules are all to be added to the cost of thymol and a third factor in increasing its expense is that a considerable amount of time of trained dispensers would be occupied in preparing a large number of doses. Against this tetrachlorethylene requires no excipients nor capsules and it can be rapidly and accurately measured by anyone with ordinary intelligence but with no special training as a dispenser†. A final advantage of tetrachlorethylene according to our method of treatment is that it is mixed directly with the dose of purgative shaken up and given immediately in a single dose whereas thymol is given in one or two portions which are followed in an hour or two by the purgative so that the time taken to complete the treatment with this drug is much greater than that occupied in giving tetrachlorethylene.

Accordingly our final conclusion is that tetrachlorethylene is a better drug for the treatment of hookworm infection on the grounds of lower toxicity lower cost greater ease of dispensing less time taken in completing a treatment and greater efficiency.

ii. Lane writes of thymol among hookworm killing drugs, "I think there was, and still is reasonable evidence that the drug's position is where Ashford put it—that it is the safest of all efficient anthelmintics. Two happenings in Calcutta are dealt with

The first is a series of papers by MAPLESTONE and MUKERJI. After experiments on cats and many years experience in treating man they adopted 4 cc. as the dose of tetrachlorethylene for man but since LAMSON ROBBINS and WARD (1929) reported that the absorption of this drug varied greatly with species, there is no evidence that experiments on the cat may be taken confidently as evidential for safe dosage in man. In determining safety of anthelmintics it is not the years over which treatments are spread but their numbers that matter (Maurice HALL advised 100 000). As to efficacy these writers tested their results by D.C.F. and treated with tetrachlorethylene three series of patients as follows: treated 28 dose 3 cc. unwormed 16.7 per cent. treated 81 dose 4 cc. unwormed 61.7 per cent. unwormed and nearly unwormed 75.3 per cent. treated 25 dose 4 cc. unwormed 36 unwormed and nearly unwormed 88 and this dose brought away 99.1 per cent. of the total bag of necators and 96.1 per cent. of that of ancylostomes. When to 4 grammes of tetrachlorethylene they added 1 cc. of that efficient anthelmintic oil of chenopodium of B.P. strength, they unwormed 62 per cent. of a series of

* These are pre-war prices in Calcutta.

† An accurate and efficient measure for dispensing tetrachlorethylene is an old fashioned type of hypodermic syringe of 5 c.cm. capacity which has a screw nut on the plunger bar to limit the excursion of the plunger so that any desired amount of liquid less than 5 c.cm. in volume can be automatically measured. In the present instance the screw is adjusted so that only 4 c.cm. can be drawn into the syringe. Used without the needle attached, accurate doses can be measured in this way and expelled into already prepared doses of the purgative with the greatest rapidity.

infection of this may kill them within a few days. For 4 months after infection adult dogs retain fertile females emitting young, and pass the infection on to adolescent dogs in contact with them. Passage through man does not seem to enhance virulence. The rarity of spontaneous canine infection seems to depend on a restricted exposure to it. Worms from human sources, which have both direct and indirect cycles, show only the indirect cycle in the dog so when FÜLLEBORN found only this indirect cycle in the dog in the Far East he did not in fact give evidence for two species. These variations of virulence according to host source make the epidemiology very complex. C L

FAUST (Ernest Carroll) & DE GROAT (Albert) Internal Autoinfection in Human Strongyloidiasis.—*Amer J Trop Med* 1940 May Vol. 20 No 3 pp 359-375 With 7 figs. on 2 plates [28 refs.]

This is a wide survey of the subject and results of examination of certain organs of a boy of 12 who died from the infection are given.

The boy greatly emaciated and with abdominal pain died shortly after admission to hospital about the beginning of the fourth week of his illness. Only a limited autopsy was permitted.

The case reported in this communication provides additional evidence demonstrating a relatively heavy invasion of the deeper layers of the bowel wall and liver by filariform larvae derived from mother worms situated in the overlying mucosa. Except for a localized eosinophilic response around the migrating worms no cellular reaction was provoked by this invasion. This stands in marked contrast to the picture of leukocytosis with hypereosinophilia which characterizes the usual case of acute strongyloidiasis.

Self-infection in strongyloidiasis may result (a) from the perianal invasion of filariform larvae (b) from the invasion of the mucosa of the lower levels of the bowel by filariform larvae which have originated from sites of infection at higher levels (c) from the penetration of filariform larvae into the deeper layers of the bowel at the same level where they were produced in the mucosa, or (d) from unmetamorphosed rhabditoid larvae massively penetrating through the muscularis mucosae into the deeper layers of the bowel wall.

Probably all persons harboring *Strongyloides* are potential subjects of self infection.

Self infection with *Strongyloides stercoralis* may be controlled, or at least measurably reduced by heeding certain dicta of personal hygiene by providing adequate nutrition and hematopoietic stimuli and by diagnosis and treatment of the infection. C L

Hsü (H. F.) FAN (Y. C.) TAN (C. C.) & CH'EN (K. Y.) Two Cases of Heavy Infection by *Ascaris lumbricoides*.—*Chinese Med J* 1940 Feb. Vol 57 No 2 pp 168-175. [11 refs.]

In the first case a dirty patient from the Peiping Municipal Psychopathic Hospital died of a torn and perforated intestine. At operation 1,533 ascaris worms were removed from the peritoneal cavity the condition did not allow the operation to be completed and at autopsy the number found brought the total to 1,978. Of these one lay in each Fallopian tube, while numbers still in viscera were—oesophagus 10 stomach 56 duodenum 5 jejunum 90 ileum 69 colon 7. The worms escaped from the intestine in a rupture 205 cm. above the

ileocaecal valve. The second patient after taking santonin passed 320 well grown worms. The proportion of males to females was 1 to 1.02 in the first and 1 to 2.2 in the second patient C L

PENEY (M) *Méningite aigue d'origine ascaridienne.* [Acute Meningitis from Ascaris]—*Bull Soc Path Exot* 1940 Feb 14 Vol 33 No 2. pp 132-134

A boy of 14 had a temperature of over 40°C had severe headache general hyperaesthesia and lay like a gun dog whining [couché en chien de fusil, geignant]. Spinal puncture showed a turbid fluid, with no bacteria, no glucose many lymphocytes and a few normal polymorphs. A second puncture next day had the same turbidity and while all was in readiness to inject antimeningitic serum into the spinal meningeal cavity forthwith his father pointed out that the boy had passed an Ascaris in his stools. So the injection was put off particularly as his temperature had fallen to 38.6°C. he was given santonin expelled some fifty Ascaris and was cured. In the differential diagnosis stress is laid on the desirability of determining whether the absence of glucose here noted is significant C L

BERGER (Julius) & ASENJO (Conrado F) *Anthelmintic Activity of Crystalline Papain.*—*Science* 1940 Apr 19 Vol. 91 No 2364 pp 387-388

Crystalline papain in adequate strength and over an adequate time digests *Ascaris lumbricoides* *in vitro*

Each worm was placed in a test tube measuring 150 by 15 mm the fluid being added and the tube incubated at 40°C The crystalline papain was dissolved in 12.5 cc. of 0.067 M phosphate-phthalate buffer pH 5 The percentage strengths of the enzyme fluid were 0.005 0.02 and 0.11 All tests were made in triplicate. In the control the same fluid without papain was presumably used and the worms in it showed no change in 16 hours in the fluid of 0.005 percentage two of the three worms were ulcerated within this period in 0.02 percentage all were badly ulcerated and partly digested in 0.11 percentage all were completely disintegrated and well digested. C L

MISCELLANEOUS

GIEMSA (Gustav) & NAUCK (Ernst G) *Eine Studienreise nach Espirito Santo Volksbiologische Untersuchung einer deutschstämmigen Bevölkerung in Mittelbrasilien als Beitrag zum Akklimatisationsproblem* [A Study Tour in Espirito Santo]—*Hansische Universitäts Abhandlungen a.d. Gebiet d. Auslandskunde* 1939 Vol. 48 Reihe D Med. u. Vet. Vol. 4 pp x + 76 With 71 figs. & 1 map

There is only one short chapter in this publication which is of interest to readers of the *Tropical Diseases Bulletin* namely that dealing with nosology Other chapters are concerned with soil climate and traffic

It is owing to the similarity of the response of both avian and human parasites that the anti-malarial drugs tested on birds proved to be successful in the treatment of human malaria. Since no drug has yet been found which destroys all stages of the parasite in the vertebrate host chemotherapeutic investigations on bird malaria will continue until such a remedy is discovered. In this chapter details are given regarding dosage methods of selection and administration of drugs, and the mode of their action in birds.

Chapter 9 is devoted to a description of the sexual cycle in and transmission by mosquitoes. Only a brief outline is given of the actual stages of development the stress being laid mainly on gametogenesis and the conditions governing the sexual processes in avian plasmodia. In the section on transmission a useful list is given of the known vectors of the avian parasites. The technique of rearing and feeding these insects and the epidemiology of bird malaria are also discussed. A whole chapter (10) is allotted to the puzzling erythrocytic stages of development in *Plasmodium* and to the fate of the sporozoites in the vertebrate host, questions which so far remain unsolved. In the last chapter (11) a number of useful suggestions are given regarding problems for investigation in avian malaria. There is a bibliography containing 532 entries and a subject index.

Dr Hewitt has rendered a useful service in providing the first authoritative and up-to-date handbook on bird malaria, which will be appreciated not only by malarialogists—to whom it is almost indispensable—but also by parasitologists in general. Those desiring to pursue the subject deeper will find numerous references to original publications in the text.

The book is mainly intended to provide practical information relative to the material, methods and results in the entire field of bird malaria, and in this respect it will amply serve its purpose. However the addition of a few extra pages, containing brief descriptions of each of the chief avian species of *Plasmodium* and a fuller account of the life-cycle of the parasite would have made the monograph more comprehensive and enhanced its value for a wider circle of readers. As it is the only recent systematic description of the avian parasites is a paper by the late Dr GIOVANNOLA (1939) written in Italian [this *Bulletin* 1940 Vol 37 p 367].

The publishers of this monograph are to be commended both for its general appearance and low cost. Only a few misprints have been noticed, among them an amusing mis-spelling of the adjective humoral, which is repeatedly rendered as "humeral."

C A Hoare

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[No. 3

THE AETIOLOGY OF THE SPRUE SYNDROME

A CRITICAL REVIEW

By Philip MANSON BAHR C.M.G. D.S.O. M.D. F.R.C.P.

Sprue represents a typical syndrome embracing an assembly of signs and symptoms such as should distinguish it as a definite disease which apparently originates in certain parts of the tropics and sub-tropics. When it commences as it so often does in England in erstwhile residents of the Far East it may become the object of a diagnostic dilemma. Apart from being somewhat of a medical oddity sprue has achieved popular notoriety as a disagreeable malady which may yield to an agreeable remedy in a diet of strawberries.

The sprue syndrome has long been known to medical science having been well described by a Dutchman V. KETELAER (1672) in the Dutch East Indies and later by an Englishman, HILLARY (1766) in Barbados but real scientific interest in this disease may be said to date from the writings of a Scotsman Patrick MANSON (1890) in China and another Dutchman VAN DER BURG (1890) in Batavia. As then so now the origin of the disease is wrapped in mystery but as the result of recent investigations and of the well-attested fact that it is apt to affect residents of long-standing in the Far East Manson's jest that sprue might well constitute the past participle of the verb to spree may well be not far from the mark.

The main points about sprue are that it is chronic in its course distressing in its symptoms proceeding if unchecked to a miserable long-drawn-out end. In its geographical distribution it exhibits a marked preference for the Far East—India, Ceylon, Malaya and Southern China—but it is also found to a lesser extent in the West Indies, the neotropical regions and even in the Southern United States. For some as yet unexplained reason, sprue is absent from or extremely rare in Central Africa though the reviewer (1928) has described an authentic case from Nyasaland. The disease shows a marked preference for the light-skinned European but is occasionally seen in the Mongolian races in the Malays and in Indians. It appears to be rare in the highly pigmented Tamil and negro races. Both sexes are almost equally affected (given equal opportunity) and it attacks adults but children under 15 very rarely, the youngest recorded being 11 years of age [MILLER (1933)] for usually the sprue attack commences in the third or fourth decade of life. The tendency to remissions is one of

its chief characteristics and most extraordinary of all is its latency in which it surpasses almost any other chronic disease. It can commence apparently *de novo* twenty-five or even forty years after the patient has left the supposedly endemic area [MANSON BARR & WILLOUGHBY (1930)] Several instances of this have come under the reviewer's observation.

Sprue is characterized by diarrhoea of a peculiar kind—the passage of copious, pale, fermenting and foul-smelling stools—by emaciation, glossitis, stomatitis, meteorism, cramps and tetany and, finally by a severe megalocytic anaemia generally acknowledged to be indistinguishable from that of true pernicious anaemia. The biochemistry of sprue suggests that the composition of the stools may be due to intestinal hurry and to the non-absorption of already partially split fats whilst the blood chemistry is characterized by decreased assimilation of calcium and glucose also due to the same fundamental cause. Pernicious anaemia and sprue have many features in common so that it has been suggested from time to time that the former may constitute a geographical variety of the latter. It is now becoming clearer that pernicious anaemia also exhibits certain geographical peculiarities, being especially prone to afflict peoples of the northern hemisphere and extremely rare or absent in native tropical races so much so that, as far as their range is concerned the one might almost be the counterpart of the other [DE LANGE & LICHTENSTEIN (1936)] But against the assumption of the identity of these two diseases may be advanced general habit and course emaciation diarrhoea abdominal symptoms, and tendency to spontaneous cure in temperate climates in all of which sprue differs from pernicious anaemia. In response to liver treatment (extrinsic factor) however there are parallel features between these two distinct conditions.

Every effort to associate sprue with any definite micro-organism peculiar to those countries in which it occurs, or with any other specific predisposing cause has failed, so that study has in recent years been mainly devoted to its biochemical aspects. In the reviewer's experience one fact appears certain, that in frequency and severity the incidence of sprue has diminished in recent years, and, therefore this possibly depends to some extent on improved hygienic and dietetic conditions.

There are some plausible reasons for associating sprue with pellagra, mainly because they have several features in common, are apt to occur in the same countries and also because the glossitis and stomatitis of sprue appear to be of the same nature, reacting in the same manner to the vitamin B₃ complex and dietetic therapy as do those of pellagra. Furthermore, pellagrous dermatitis may be engrafted upon cases of long-standing sprue, as indeed it may upon any other chronic intestinal disorder but primary pellagra usually occurs in underfed peasants subsisting on an ill-balanced dietary. Thus it is generally acknowledged to be an avitaminosis due to the absence of the PP factor (vitamin B₃) and this has been abundantly proved by its experimental production in man as well as in animals notably in the disease known as "black tongue" in dogs, which is curable by nicotinic acid. "Secondary pellagra" in chronic alcoholics, in patients suffering from chronic intestinal disease or as the result of surgical interference with the gastrointestinal canal (as quoted by SPIES and his colleagues) influencing normal absorption is now well recognized. (Similarly pernicious anaemia and the sprue syndrome may be produced by

surgical interference with the stomach and small intestine as is later emphasized in this review) But there are several points in common between these two apparently dissimilar diseases. The main distinction lies in the photosensitive pellagrous dermatitis the tendency to seasonal incidence the character of the associated anaemia and the liability to involvement of the central nervous system leading to dementia. The porphyrinuria of pellagra recently described [BECKH ELLINGER & SPIES (1937)] may be due to absorption of amino bodies from the bowel [CHALMERS GILLAM & KENCH (1940)] In connexion with this point RAU (1940) has stated that a congenital porphyrinuria is recognized which exhibits photo-sensitive skin lesions and is amenable to vitamin B₂ treatment whilst SPIES (1938) has shown that in pellagra the coproporphyrinuria disappears with nicotinic acid treatment but on the whole the biochemistry of the stools differs from that of sprue though pale fatty fermenting stools may sometimes be observed. It is only in its nerve complications that pellagra forms a link with the subacute combined complication of pernicious anaemia

A further difficulty arises in understanding the true nature of sprue in the case of two other apparently closely related steatorrhoeas—namely coeliac disease which appears to be a congenital absorptive defect in childhood responds mainly to dietetic treatment and is associated with rickets genital dystrophies tetany meteorism megacolon and emaciation and idiopathic steatorrhoea a similar disease in adults of the second and third decades of life which is associated with osteomalacia megacolon and anaemia, frequently assuming the pernicious type a tendency to haemorrhages and changes in the hair and nails [BENNETT HUNTER & VAUGHAN (1932)] The resemblance to tropical sprue is great in so far as the biochemical background in both these last named disorders is practically identical with it The faeces have a similar composition again the result of intestinal hurry and of the inability of the cells of the small intestine to absorb fats the pancreatic functions being as far as can be ascertained normal The blood chemistry is on the whole similar the result probably of malabsorption from the small intestine. Idiopathic steatorrhoea in adults is now generally regarded as a hang over of former coeliac disease in infancy There is here again delayed onset comparable to what occurs in delayed sprue It differs mainly from sprue in the bone changes the almost invariable presence of megacolon and in its intractability to liver and vitamin B₂ treatment. The anaemia is usually not by any means so severe and some cases proceed to a fatal issue without the supervention of any gross blood changes.

This last problem has been further complicated during recent years by the description of a fourth variety of steatorrhoea in Northern European countries and also in the United States which has been christened non tropical sprue. The reviewer described a case of this condition as indigenous sprue in 1929 [MANSON BAHR (1929)] and several other cases were cited by various workers in Germany and Holland, but their true import was discounted when the true facts about idiopathic steatorrhoea became more generally appreciated. In 1932 H THAYSEN wrote a monograph on non tropical sprue from which it appears that a number of cases in Denmark and Norway resembled true tropical sprue in their clinical course appearances and reaction to treatment and from this he decided that the latter

disease was no longer tropical in origin [THAYSEN (1935)]. Criticisms levelled at this view were based at that time on the supposition that in several instances he had confused the issue between tropical sprue and idiopathic steatorrhoea. The existence of a sprue-like disease in England distinct from the latter and in which the biochemical findings resembled true sprue has been confirmed quite recently by BEXSETT and HARDWICK, and now the reviewer has encountered two other cases falling into this category in London which if they had recently arrived from the tropics would certainly have been diagnosed as tropical sprue and which have reacted in the same satisfactory manner to nicotinic acid and vitamin B₁₂ treatment. It would, therefore appear necessary to enquire into the vexed question as to whether sprue is after all a true tropical disease, or whether it merely represents an accentuated form of what really is a world-wide malady. The above comparisons and suggestions have led the reviewer to ponder further whether sprue is a definite and distinct disease rather than a clinical state due to damage to the mucosa of the small intestine in other words due to "chronic jejuno-ileal inefficiency".* That the "sprue syndrome" is the clinical expression of disease of the small intestine has been made sufficiently clear by BEXSETT and HARDWICK (1940) who introduced the term "insufficiency" in the same sense. There is little doubt that the sprue syndrome may be produced by a number of diverse surgical and medical conditions. The main argument in this direction lies in clinical observations on gastro-jejuno-colic fistula [DE RIVAS (1930) FAIRLEY & KILKER (1931)] which produces the main clinical and biochemical manifestations of sprue including glossitis and megalocytic anaemia. A similar clinical state has been observed as the result of an ill-functioning gastrojejunostomy a case of which has been investigated by the reviewer. Other well-accentuated diseases of the small intestine which interfere with its functions may produce the same end result, such as ulceration of the ileum, blockage of the lymphatic supply of the bowel, as in tabes mesenterica, lymphadenoma, lymphosarcoma of the mesenteric glands [FAIRLEY & MACKIE (1937)] whilst malignant disease of the small gut† may do the same. It now seems as if some logical order could be evolved from what has seemed clinical chaos.

Shortly after the discovery of the identity of nicotinic acid with the PP factor this substance was introduced for the treatment of pellagra by SPIES in 1937 [SPIES (1938)]. He based his assumption mainly on the observed effects of this substance on the correlated "black tongue" disease in dogs.

From the commencement it was noted that nicotinic acid exerted its most profound and easily observable effect upon the glossitis and stomatitis of pellagra and later upon the mental manifestations of this disease. Soon came the discovery by SEBELL & BUTLER (1939) of the existence of another factor in *cheilosis* or angular stomatitis which they regard as the chief sign of "ariboflavinosis" and which is amenable to riboflavin therapy.

It is suggested that "inefficiency" would best explain the inability of an organ to exert its proper and normal functions and in this sense it is employed in this review.

† A case of this description has occurred in the reviewer's practice in a patient who had been regarded as sprue for five years and eventually died of a neoplasm of the jejunum.

The reviewer claims [MANSON-BAHR (1940)] to have demonstrated that the therapeutic effect of nicotinic acid on the sprue tongue and of riboflavin on angular stomatitis of sprue is similar to that found to obtain in pellagra and this observation has now led him to apply this form of therapy to sprue cases in general. The results so far obtained in 24 severe cases of tropical sprue would indicate that this constitutes a highly satisfactory method of treatment the glossitis is healed within a period of four days and the intestinal symptoms especially the meteorism improve shortly afterwards. Finally the diarrhoea ceases entirely and the stools become normal in size and colour. Indeed it seems to be the most satisfactory method of treatment for tropical sprue yet introduced. The dose of nicotinic acid necessary to bring about this result is 300 mgm. daily for one month and if angular stomatitis is present the addition of riboflavin 3 mgm daily is also advisable.

As far as observations have gone at present it is permissible to state that nicotinic acid is also effective in the glossitis of pernicious anaemia and in that occasionally seen with subacute combined degeneration of the cord. It also improves the glossitis of idiopathic steatorrhoea, but unfortunately appears to exert no appreciable permanent effect on the intestinal manifestations of this disease. Furthermore and in view of the implications of this basic idea nicotinic acid cures the glossitis of the 'false sprue' of gastro-jejuno-colic fistula as well. On the last two cases of non tropical sprue which have come under treatment the effects of nicotinic acid therapy were most striking and parallel to those observed in true tropical sprue. An analysis of these assembled facts, based mainly upon clinical observation would indicate that what has already been prophesied by ELDERS (1917) NICHOLLS (1934) and others that sprue is the expression of disease of the small intestine is true and it now appears to be due to an avitaminosis through faulty absorption. It is difficult on the assumption of an avitaminosis to explain the latency of a proportion of tropical sprue cases which has already been sufficiently emphasized but possibly the interpretation which has been put upon this phenomenon may not be correct as they may indeed be instances of non tropical sprue arising in a non-tropical country. It may even be necessary to postulate that what we term sprue is not a separate clinical condition but an assembly of clinical phenomena denoting former damage by some specific infection of the gastro-intestinal tract with the main onus directed to the ileum in other words sprue is the result of dysfunction of some specialized cells in the same manner as is now generally accepted for pernicious anaemia in respect of the pyloric and Brunner's glands of the duodenum. In pernicious anaemia, however the dysfunction is complete and permanent necessitating the continuous replacement of the intrinsic factor to maintain health. In sprue the dysfunction is apparently temporary and complete cure is frequently observed without the need for continuous replacement. Sprue is comparable also with uncomplicated pellagra in which no visible macroscopic or microscopic lesions can be demonstrated in the intestinal tract but the syndrome of which is incontestably often brought about by destructive disease of the mucosa, as by bacillary and amoebic dysentery or by extensive tuberculosis—thus giving rise to: secondary pellagra. (The coexistence of chronic bacillary dysentery with fatal pellagra was recorded by the reviewer in 1919) [MANSON BAHR (1919)]

These facts give much food for thought and more still for temperate speculation. But this is not the whole story. There is the sore tongue disease which has been often described in this *Bulletin* and to which the reviewer drew attention in Ceylon in 1912 [BANK (1915)] and which is often accompanied by angular stomatitis, in all regions where pellagra is endemic without any other of the conspicuous manifestations of this avitaminosis. For a long time this has been regarded as "prepellagra" or "larval pellagra," which implies that it represents one phenomenon of the incompletely developed disease. Sometimes these cases are succeeded by dermatitis and other of the cardinal signposts of pellagra. This form of glossitis too has been shown to respond to nicotinic acid therapy, in the same dramatic manner. Sore tongues of pellagrous nature have been encountered by the reviewer in England and these have the same pathological features as the prepellagrous tongue of the tropics and may therefore legitimately be regarded as examples of "larval pellagra." They are found especially in women subsisting on an ill-balanced dietary mainly because they are victims of "colitis" or some other chronic gastro-intestinal disorder. They also are amenable to a remarkable degree to nicotinic acid therapy. The reviewer claims that there is a further link indicating the underlying interconnecting factors in this group of diseases, namely that in sprue there exists a "larval" or "pre-sprue" condition manifesting itself in a similar glossitis which may also antedate the development of the fully-developed disease. Thus it seems that glossitis of a similar nature may precede either the sprue or pellagra syndromes and it is impossible to predict into which of the two diseases it may develop. The implications of this knowledge would seem to be far reaching and to transcend the more narrow limits of tropical medicine. It may be accepted as an axiom that study of disease in hot climates and under primitive conditions is enriched by the opportunity of observing clinical manifestations under the most favourable circumstances. Once this truth is recognized, the possibility of minor manifestations of the same process or the same initial malady occurring in temperate countries, where its existence has not been suspected, can be appreciated.

It is now possible to evaluate in some measure the lesson of sprue and possibly to understand the value of former and now practically discarded dietetic treatments—the milk treatment of Patrick MAXSON, the beef treatment of James CASTLE and the liver treatment of MINOT & MURPHY (which was first adopted by the Chinese ages ago for this disease) as it is now possible to conceive that the virtue of these various remedies may reside in their nicotinic acid content.

The reviewer has for some time been occupied in digesting the main facts of the résumé of this problem cited above, from which it appears that in the disease-group typified by the pernicious anaemia-pellagra-sprue syndrome the essential causative lesion is localized somewhere in the gastrointestinal tract, and is of such nature and extent as to interfere more especially with absorption of one or several of the vitamins essential to life. As stated above, the inability of the absorptive mucosal surface to perform its intricate and proper functions is best expressed by the term "inefficiency." We can, therefore, apply this idea to parts of the intestinal tract and speak about "gastronododenal inefficiency," "jejuno-ileal inefficiency," "ileocaecal inefficiency" and so forth.

The hypothesis is therefore set forth—on the basis of clinically observed end-results of surgical interference upon the gastro-intestinal tract—that in order to produce the syndrome characteristic of each disease the essential lesion should involve some particular and limited tract as illustrated in the accompanying diagram. This is still further explained in a table purporting to show the probable sequence of events. It is based upon an endeavour to fit in the already ascertained facts regarding these disease syndromes.

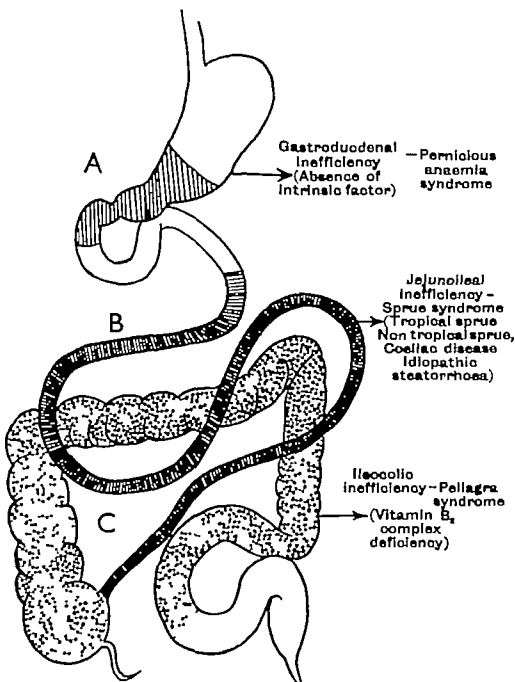


Diagram showing probable sequence of events in the pernicious anaemia, sprue, and pellagra group

[The shaded portions A, B and C indicate the parts of the gastro-intestinal tract involved in the syndromes of pernicious anaemia, sprue and pellagra respectively]

TABLE.

A. *Ferricious Anaemia Syndrome*—"gastrointestinal inefficiency"

- 1 Primary Pernicious Anaemia.
Naturally occurring disease (absence of intrinsic factor)
- 2 Secondary Pernicious Anaemia
Artificially produced disease subsequent to partial gastrectomy

B. *Sprue Syndrome*—"jeuno-ileal inefficiency"

- 1 Primary Sprue
Naturally occurring disease *Typical Tropical Sprue. Atypical Nontropical Sprue*
- 2 Secondary Sprue
Artificially produced disease subsequent to gastro-jeuno-colic fistula, gastro-jejunostomy and short circuit, neoplasm of small intestine, mesenteric tuberculosis, lymphadenoma, etc.
- 3 Coeliac Disease
Congenital absorption defect in small intestine proceeding to idiopathic steatorrhea in adults.

C. *Pellagra Syndrome*—"ileocaecal inefficiency"

- 1 Primary Pellagra.
Naturally occurring disease (absence of Vitamin B₃ complex)
- 2 Secondary Pellagra.
Artificially produced disease—damage to ileum and mainly to large intestine by chronic bacillary or amoebic dysentery, alcohol and surgical interference.

This hypothesis is set forth in a somewhat crude and didactic manner as an attempt to stimulate further research. The means for doing so are at the present moment limited and it seems a favourable opportunity for impressing upon those more opportunely situated to pursue clinical observations and experiments on the lines suggested above. We have at present identified several factors and vitamins which appear to be concerned in these intricate processes and there are probably others equally important which remain to be discovered.

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SUMMARY OF RECENT ABSTRACTS •

III. MALARIA.

Epidemiology

A number of surveys have been reported, other than those dealt with more specifically in the text below. These are recorded for convenience, in tabular form —

Author	Page	Place	Spleen rate	Parasite rate	Commonest infection	Commonest vector
			Per cent	Per cent.		
Fratani ..	496	Bem Abbes	41	70.0	MT	—
Comadetti	452	S. Dancuba	—	9.8	MT B.T	<i>A. gambiae</i>
Gilroy ..	52	Darjeeling	68	49	MT	<i>A. sinensis</i>
Russell & Jacob	53	Madras	63.4	63.2	MT	<i>A. culicifacies</i>
Covell & Harbhagwan	740	Wynaad S. India	59-69	17-56 (seasonal)	MT B.T	<i>A. foveolatus</i>
Gumasekara	495	Ceylon	21.2	4.5	Q MT B.T.	—
Crook	177	Szechwan	—	—	B.T MT	<i>A. sinensis</i>
Carr <i>et al</i>	684	Cuba	white 10 negro 6.6	1.2 1.6	MT B.T	<i>A. albopictus</i>
Earle <i>et al</i>	178	Porto Rico	30-40	30-40	MT B.T	—
Kimm & Ruiz	357	Costa Rica	0-40	—	Q MT B.T	<i>A. albopictus</i>

VOGEL and RIOC (p. 125) have given an account of malaria during 1937 in the French Colonies.

In Sardinia PICCALUGA (p. 358) notes that gametocytes of *P. vivax* are commonly found in spring and summer and that those of *P. falciparum* and *P. malariae* are more prevalent in autumn.

MANDEKOS (p. 183) discusses the general mortality in children in two areas of Macedonia where the parasite rate is usually high. The rate in children who harbour parasites is no higher than in those who do not — it is probable that the former receive more medical attention. Infant mortality in malarious areas does not appear to be much influenced by economic status.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1940, Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

JAKUSHEVA (p 451) shows that in the north of the U.S.S.R. the maximum incidence of malaria is in the spring and summer and that only one-third of the earlier cases are due to relapses the remainder being primary infections with long latent periods. In the south on the other hand prolonged incubation is rare and the maximum incidence is in summer and autumn, with a slight rise in spring due to relapses.

Writing of malaria in Abyssinia PANSINI (pp 126-452) states that the disease is very widespread, especially in the lowlands but also at altitudes as high as 2 000 metres. Attacks occur in Italian workers in spite of prolonged quinine prophylaxis and among the patients invalided back to Aversa from Abyssinia the author found that the infections were mainly due to *P. vivax*. In hyperendemic areas of Abyssinia CORRADETTI (p 358) shows that in previously uninfected persons *P. falciparum* infections predominate at first and that *P. vivax* appears later though both are probably acquired at the same time. Malaria prevails in epidemic form from July to October in which period is included the rainy season. He (p 665) reports on malaria in the Uollo [or Wollo] Jeggu region of Abyssinia in which district is the town of Dessie at the junction of the road from Assab with the road from Asmara to Addis Ababa. Below 1 000 metres malaria is hyperendemic near permanent collections of water but epidemics occur throughout the rainy season. Between 1 000 and 1 500 metres malaria is largely seasonal and may assume epidemic proportions it is also seasonal between 1,500 and 2,000 metres. Above 2 000 metres no case of locally contracted malaria was seen. *A. gambiae* is the common vector and *P. falciparum* and *P. vivax* the most frequently found parasites. These observations were made on Italians only thus eliminating factors which would have arisen had immune natives been considered. The majority of the Italians were employed on road construction. He further (p 452) notes that in S Dancalia Abyssinia malaria incidence is high during the dry season in the neighbourhood of perennial streams and throughout the territory during the rains.

DE MEILLON and GEAR (p 739) report infection with *P. ovale* in S Rhodesia and WEBB and HERVEL (p 739) record two cases in Mauritius.

CROS (p 496) found a spleen rate of 50.75 per cent in children in Madagascar with but little difference between the flat marshy coastal cantons and the hilly interior cantons.

KRISHNAN (p 858) has studied the epidemiology of malaria in Bengal where *A. philippinensis* is the carrier. It is possible to predict an epidemic on the basis of the amount of rain falling in the drier months of the year and on the relative incidence of *P. malariae* and *P. falciparum* in the drier months. If the latter predominates at that time, an epidemic in the later months (the normal malaria season) may be expected. RUSSELL *et al* (p 782) report observations made on two areas in India in one malaria transmission takes place throughout the year in the other it is seasonal.

In Ceylon GUNASEKARA (p 495) reports that in the three zones defined as wet intermediate and dry the parasite rates are 0.9, 5.5 and 7.7 per cent. and the spleen rates 4.9, 28.1 and 36.6 respectively during the period February-March when the annual malaria recruitment is declining. The investigations were made in school-children.

The Malaria Advisory Board of the F.M.S. (p. 284) record an increase in malaria in 1937 and suggest that the facilities offered by extensive replanting of rubber for the breeding of *Anopheles* played an important part in this respect.

FARINAUD and PROST (p. 494) state that in a district of Cambodia where the population is steadily diminishing malaria is chiefly responsible, that infants are all infected in the first year of life and that the infant mortality rate is 308 per 1 000. *Anopheles sinensis* is ubiquitous. MOSTEL and DO-VAN HOANH (p. 599) report that in the native quarter of Saigon there is more malaria than is generally supposed. FARINAUD (p. 128) reports on malaria in Poulo-Condore, a small island off the coast of Cochun-China. Epidemics occur and there is frequent importation of fresh strains of infection. In two areas of the Tonking Delta MARNEFFE *et al.* (p. 355) show that outbreaks of malaria take place at the beginning of summer and towards the end of the year. During these outbreaks *P. falciparum* infections are as common as those of *P. vivax* and pernicious attacks occur. The constant coolie traffic between these areas and areas of hyperendemic malaria is an important factor in maintaining infection. GENEVRAY *et al.* (p. 684) show that in Hanoi the amount of malaria is very small.

BINPHAM (p. 284) reports on malaria in the Southern United States, where in school-children 35 per cent. of the infections are with *P. falciparum*. The parasite rate varies between 4 and 9 per cent. FAUST (p. 178) discusses malaria in relation to life insurance in Southern United States.

In the province of Oriente Cuba malaria endemicity is low but CARR *et al.* (p. 664) report that occasional epidemics occur. Malaria is almost confined to places below an altitude of 1,000 feet and is most prevalent in the Cauto River valley.

EARLE *et al.* (p. 178) report careful investigations on children, who rarely receive antimalarial drugs, in Porto Rico. Periodic examinations were made between 1931 and 1934. *P. falciparum* was most commonly found, but mixed infections were not rare. Often *P. vivax* infections were replaced by *P. falciparum*, the former reappearing when the latter had reached a low level. *P. falciparum* incidence was highest immediately following rises in mosquito density. Gametocytes of *P. vivax* were highest in the first week of infection, those of *P. falciparum* in the third week. Highest parasite counts and largest spleens were found within a few weeks of first infection. The authors believe that the onset of new infections can be determined and that each infection probably runs a definite course to a natural cure. EARLE (p. 495) has studied conditions in Porto Rico where malaria, though present is not hyperendemic. Local epidemics occur the highest spleen rates are found between 10 and 20 years of age. Malaria causes considerable illness at all ages and no special group is a source of mosquito infection. *P. vivax* causes most infections between 5 and 9 years, but *P. falciparum* predominates at later ages.

KUON and RUIZ (p. 357) in Costa Rica found malaria almost confined to the Atlantic and Pacific seaboard and rare at heights above 1 000 feet. Quartan infection is rather more common than benign or malignant tertian.

HERNAN MEXDEZ (p. 856) has found *P. ovale* in Venezuela, where it has not hitherto been recorded.

GIGLIOLI (p 356) in British Guiana has compared groups of estates according to the spleen rates. A table of the findings may be constructed which shows correlation between the various factors recorded —

Spleen rate	Under 5	5 to 30	Over 30
Births per 100 deaths	244	152	119
Infant mortality rate	113	165.9	170.9
Stillbirth rate	47	78	92

ACCINELLI FERNANDEZ (p 355) suggests that in plantations in Peru malaria should be regarded as an occupational hazard.

Aetiology

SERGEANT *et al* (p 179) discuss the nomenclature of malaria parasites adopting the names *P vivax*, *P malariae* and *P falciparum* and for the avian parasite *P relictum* in place of *P praecox*.

RAFFAELE (p 285) has made a study of the formation of male gametocytes from the microgametocytes.

FIELD and LE FLEMING (p 739) have described the morphological features of *P falciparum* in thick films.

MOSNA (p 55) shows that a Roman strain of *P falciparum* was more virulent than an Ethiopian strain.

BASU (p 55) found that crescents in the blood of patients infected with *P falciparum* were not infective for *Anopheles stephensi* for the first 4 days of their appearance in the blood or from the 27th to the 40th day. Between the 4th and 20th days they were highly infective.

VAN DEN BERGHE and KOVACS (p 128) found, in *P falciparum* infections that mature erythrocytes were much more frequently affected than reticulocytes. KITCHEN (p 179) however found that *P falciparum* is not consistent in its tendency to be associated with erythrocytes of any particular age. *P malariae* is most usually found in the mature cells but *P vivax* has a greater tendency to infect reticulocytes. In infections with *P vivax* VRYONIS (p 360) found that ring forms occurred over a hundred times more frequently in reticulocytes than in mature erythrocytes. The explanation offered is that it is the stickiness of the reticulocytes which accounts for the frequency of their infection with *P vivax* rings. During the early stages of infection there was a transient rise in the number of reticulocytes after each paroxysm.

BOYD (p 739) finds that well fixed subspecific varieties of *P vivax* and *P falciparum* may be detected by immunological methods. These may show slight morphological differences but it is not yet clear that such characters are fixed and it is observed that a local strain of parasite may or may not be specially suitable for infecting the *Anopheles* with which it is closely associated in nature.

YOUNG *et al* (p 783) describe detailed observations on the behaviour of a strain of *P malariae* inoculated into a series of Negro

states that below 1 000 metres the breeding is intense throughout the year near permanent collections of water and during the rainy season breeding is ubiquitous. Between 1 000 and 1,500 metres breeding is scanty in the dry season, but in the rains it is intense, and epidemic malaria occurs. Malaria is transmitted up to 1,900 metres during the rains, but has not been seen above 2,000 metres. Although *A. gambiae* is much the most important vector *A. pharoseris* may also transmit the disease. He (p. 793) also notes that *A. gambiae* is the vector in the Combolca plain of Italian East Africa, where the malaria season is from September to December. In this rainy season the whole plain becomes in effect a mosquito-breeding marsh. In Mombasa, WISEMAN *et al.* (p. 786) found *A. gambiae* larvae in artificial containers and in wells. Adults were more common in houses on the mainland than in those on the island and considerable numbers are brought into the town by the trains. *A. funestus* is also present but is not an important vector on the island.

DR. MEILLOU and GEAR (p. 128) discuss certain cases of malaria which have recently been contracted on the Witwatersrand, an unusual occurrence. These were probably due to infected *A. gambiae* brought in by motor vehicles from known malarious areas and although *A. gambiae* may breed near Johannesburg, the chances of their becoming infected are small and they are not likely to survive winter conditions. The other anophelines of the district are all zoophilic in habit.

ADAMS (p. 788) has shown that in N. Rhodesia *A. funestus* can fly 4.5 miles down wind and 1.5 miles at an angle of 30° up wind. *A. gambiae* can travel 4.25 miles down wind and 1.5 miles at a right angle down wind. Efficient anti-larval measures carried out for half a mile on the edge of an inhabited area in a copper-mining township were insufficient to keep the mosquitoes away.

PINHO (p. 496) has found that *A. gambiae* which has invaded Brazil from West Africa corresponds to the type form and not to the variety *melas*. The most important breeding places are collections of sweet, stagnant clear water exposed to sunlight and covered by aquatic vegetation, especially *Pistia stratiotes*. Infection was found in 1892 to attain the extremely high figure of 82 per cent. References are made to the pandemic of malaria which followed the introduction of *A. gambiae* into Brazil in 1928. BARNER (p. 657) also discusses there before this mosquito arrived, its advent was followed by an epidemic outbreak. The seriousness of the position is stressed.

RUSSELL and MOHAM (p. 741) show that *A. stephensi* bred in the insectary may be used as a standard with which to compare other species in experimental infection work. In experiments with *A. stephensi* RUSSELL and MOHAM (p. 359) found that the chemical character in the water in which the mosquito breeds has little or no influence on the susceptibility of adults to infection with *P. falciparum*. The same authors (p. 359) found that *A. stephensi* were positive for susceptible as the type form to infection with *P. falciparum*. In Delhi, ARABI *et al.* (p. 500) found that the race *mysorensis* was as a positive precipitin reaction for human or animal blood, only 1.6 per cent *A. calicifacies* and 5 per cent *A. stephensi* were positive for human blood. In neighbouring villages the percentage of mosquitoes containing human blood varied inversely with the proportion of cattle to the human population.

In part of the Madras Presidency RUSSELL and JACOB (p 53) point out that the breeding of anophelines takes place principally in the shallow wells or pits dug for the purpose of watering the casuarina trees which are grown for firewood. Malaria is very prevalent and *A. culicifacies* is the principal vector. *A. culicifacies* is not however important in malaria transmission in Bengal, and KRISHNAN (p 858) gives a possible explanation. The larvae are introduced each winter and early spring into canal water but although the conditions of temperature and CO_2/O_2 ratio in the water are favourable the relative atmospheric humidity is low and probably leads to the death of the adults. Later when the atmosphere is suitable for adults the breeding conditions become unfavourable though they are suitable for *A. philippinensis* which is responsible for transmission. He (p 744) reports that the breeding of *A. philippinensis* the malaria vector of the Burdwan district of Bengal, is favoured in tanks by a high ratio of CO_2 to O_2 and that larvae are never found in tanks containing many *Euglena*. It does not breed in rice fields.

In the Chilka Lake on the coast of Bengal WHITE and ADHIKARI (p 741) have found *A. sindaicus* breeding. This probably accounts for much that was obscure in the epidemiology of malaria in this region, though *A. annularis* and *A. acontus* probably have an effect in maintaining some degree of malaria. The authors do not approve of the recommendation for closing the outlet of the lake during the dry season and give the reasons for their views. In Bally near Calcutta, ROY (p 500) shows that *A. varuna* is a vector but *A. sindaicus* is not important.

GILROY (p 52) found that the only infected species in tea gardens near Darjeeling was *A. minimus*.

COVELL and HARBHAGWAN (p 740) show that on the hilly plateau of Wynad S India, where malaria is prevalent *A. fluviatilis* is the only important vector. It is house-haunting and anthropophilic in habit and breeds in rice field drains and grassy streams.

VINOGRADSKAYA and TIMROT (p 180) discuss the breeding of *A. superpictus* in the laboratory. In Quetta Cantonment DE BURCA (p 56) found that *A. superpictus* was the commonest anopheline though the nearest breeding place was $1\frac{1}{2}$ miles away.

STRICKLAND *et al* (p 859) found that *A. maculatus* from India though as easily infected with Malayan plasmodia as *A. maculatus* from Malaya are not easily infected in India. They conclude that the Indian plasmodia have lower infectivity than Malayan strains. WALLACE (p 287) shows that *A. maculatus* can fly as far as $1\frac{1}{2}$ miles in search of food. The experiment was made in view of the fact that anti-larval measures confined to $\frac{1}{4}$ or $\frac{1}{2}$ mile radius frequently fail to prevent seasonal waves of malaria when breeding is intense. From an inland hilly estate in Malaya in which routine catching of Anopheles had been carried out for some years, and in which cattle had been kept in considerable numbers the cattle were all removed in May 1933. WALLACE (p 287) shows that this had little effect on the numbers of *A. maculatus* caught in the coolie lines since in this part of Malaya this species is markedly anthropophilic. *A. hyrcanus* however practically disappeared after the removal of the cattle.

TOUMANOFF and CANET (p 860) show that in Cochin-China *A. hyrcanus* var *sincensis* has been found infected and point out the necessity of securing the animal deviation of such zoophilic species in addition to controlling the major vectors such as *A. minimus* and

A. jeyporiensis MARKOFF *et al* (p 355) report that the chief vector in the middle reaches of the Red River delta in Tonking is *A. hyrcanus* var *sinensis* which here is anthropophilic in habit. Elsewhere in Indo-China it is of little importance. Anophelines are abundant but none of the important species is present and the malaria is mild, diffuse and characterized by seasonal outbursts. HU (p. 181) has studied the house frequenting behaviour of *A. hyrcanus* var *sinensis* in the Shanghai area. TOMANOFF (p 288) reports his observations on the fecundity and longevity of *A. hyrcanus* var *sinensis* in Tonking.

On a malarious section of the China-Burmah highway, ROBERTSON (p 782) found *A. minimus* to be the chief vector but *A. maculatus*, *A. jeyporiensis*, *A. culicifacies*, *A. hyrcanus* var *sinensis* and *A. annularis* were also found to be infected.

VANHUIS (p 667) describes a variety of *A. hyrcanus* found in Java and Celebes which he proposes provisionally to name *A. hyrcanus X*. It is a potent vector of malaria.

VANHUIS (p 455) describes slight morphological differences between *A. barbrostris* from Celebes and from Java. He points out that in Java this species lives almost wild and is never infected, whereas the form seen in Celebes is a house frequenter and was infected to the extent of 13.3 per cent. He proposes the name *A. barbrostris var. rensis* for the Celebes form.

FAKKAUD (p 128) reports that the principal vectors in the island of Poulo-Condore off the coast of Cochín-China, are *A. ludlowi* and *A. subpictus* both of which breed in salt water.

BANG *et al* (p 742) have found a specimen of *A. walkeri* infected in nature in the Reelfoot Lake region of Tennessee and Kentucky.

HIXMAN and HURLBUT (p 788) show that in the Tennessee valley *A. quadrimaculatus* passes the winter solely as a hibernating female after insemination. They have found that shading of the breeding places is not likely to be an effective measure against this species. BOYD (p 666) notes that there is substantial agreement between the rates of infection, determined by gland and stomach dissection, of *A. quadrimaculatus* infected with *P. uixar* and finds no evidence that mosquitoes die of malaria infection while being incubated.

BOYD and EARLE (p 288) show that *A. pseudopunctipennis* is much inferior to *A. quadrimaculatus* in its susceptibility to *P. falciparum* and that *A. quadrimaculatus* from Florida is more susceptible to Mexican than to Floridian strains of *P. falciparum*. DEL POYRE (p 860) however shows that *A. pseudopunctipennis* is the principal vector at La Mendieta in the Argentine.

STONE and REYNOLDS (p 360) report evidence to suggest that eggs of *A. albimanus*, *A. tarsimaculatus* and *A. punctipennis* laid in seepage areas in Panama may hibernate through the dry season provided the eggs are covered by leaves or grass, although these seepage areas do not receive water. The earth in such places retains some moisture although it is crumbly. Eggs found at the end of the dry season require 7 to 14 days for hatching in place of the usual 24 to 48 hours. These findings may explain the sudden increase in the number of larvae found 7 to 10 days after the onset of the rains.

In Costa Rica HUMM and RUIZ (p 357) found 15 species of Anophelinae. *A. albimanus* was the most prevalent and is apparently the only vector. It flourishes in the lowlands where malaria is endemic and severe. CARR *et al.* (p 664) state that *A. albimanus* is the only important vector in Oriente, Cuba.

GIGLIOLI (p 356) produces further evidence to incriminate *A darlingi* as the only important vector in British Guiana. *A tarsis maculatus* and *A albitalis* which elsewhere are potent vectors are here of no importance.

Immunity

SINTON (p 56) gives a summary of present knowledge on the subject of immunity in malaria. There are two factors, antiparasitic and antitoxic. the defensive mechanism is (a) cellular by means of the phagocytic macrophage system which acts at first in a non-specific and sluggish manner and which is later specific and active and (b) humoral probably in the nature of an opsonin. The author holds that natural resistance is present in a large proportion of the indigenous populations of highly malarious areas. The residual immunity left after *P falciparum* infections is more fleeting than that after *P vivax* that following *P ovale* appears to be the most durable.

Applying the findings obtained in studies of *P knowlesi* infections of young non immune rhesus monkeys in which it was shown that the parasitic intensity and the duration of antigenic stimulation determine the degree and rate of acquisition of immunity SINTON (p 57) concludes that in man when infection is but rarely acquired treatment should aim at radical cure. When however exposure to infection is frequent and continued treatment should aim only at clinical cure of the attack and when exposure is to frequent infection but is only temporary clinical prophylaxis with an appropriate drug is the method of choice.

WILSON (p 182) gives the data found in a comparison of three regions of Tanganyika Territory. Spleen rates parasite rates and parasite counts are quoted. In one district transmission is continuous and firm immunity is acquired after the age of childhood. Clinical treatment is therefore only necessary in childhood and should not be intensive enough to interfere with the acquisition of immunity. In the other districts transmission is seasonal, immunity is only partial attacks of malaria may occur at all ages and require treatment. It is pointed out that where transmission is seasonal the control of anophelines may be possible.

FARINAUD and PROST (p 289) give data on the spleen and parasite rates at all ages of two races of inhabitants of intensely malarious parts of South Indo-China. In one race all infants are infected, but spleen and parasite rates fall in adult life and the adults are healthy having acquired immunity. In the other the spleen and parasite rates remain fairly constant and the former is high in adult life. Effective immunity is not acquired and the adults are sickly. The authors attribute this difference to racial factors [but on the information given this is by no means certain. The rates quoted in the first group are characteristic of hyperendemic malaria those of the second group are characteristic of seasonally transmitted disease].

SCHILLING (pp 366 790) states that it is possible to inject about 100 schizonts or sporozoites of *P vivax* in man without producing fever or parasites in the blood and that therefore man has a fundamental resistance to malaria which is not based upon premunition. Increased resistance against schizonts can however be obtained by repeated small inoculations but resistance to schizonts does not protect against sporozoites and if sporozoites are injected in small

the common vector ANDERSON and LEUCHER (p. 155) report onchocerciasis for the first time in Tunisia. Species of *Simulium* are present in the district. LEVY (p. 155) reports a case of bilateral keratitis and cycloitis attributed to *Onchocerca rostratus*.

SKELBIN (p. 155) refers to "*Loa extraocularis*" infection in Russia.

DESORTES (p. 155) identifies *Filaria conjunctivae* recovered from a girl, with *Dirofilaria repens*.

STEFANOPOULOU and DANIAUD (p. 156) show that complement fixation tests in which the antigens were obtained from *Dirofilaria immitis* were positive in patients cured of infection with *Dracunculus medinensis* for two months after cure. Intradermal reactions were positive for a longer period.

KUTTUNEN EKRAUM (p. 156) found 70 per cent of a group of children in Toronto to be infected with *Enterobius vermicularis*. CHALCO and SORIANO (p. 156) found the infection rate in Manila to be 75.2 per cent. SAWITZ (p. 156) shows that the NIH swab method is better than others in the detection of infection, and that in Havana the infection rate in children is 74.3 per cent. D'ANTONI and SAWITZ (p. 156) found that treatment with tablets of gentian violet was more effective in eliminating infection with *Enterobius* than were efforts at prevention. The cure rate in children was 90 per cent.

CATRON (p. 157) found *Trichinella* infection in 14.7 per cent of autopsies in Michigan. TERRY and WORK (p. 157) report a case of trichinosis with marked cardiac involvement; the symptoms had been mistaken for those of rheumatic fever. Lyster (p. 158) reports the use of papain in digesting out *Trichinella* cysts for microscopic diagnosis and as a basis for antigen reactions. ANDERSON *et al.* (p. 158) show that the administration of tetrachlorethylene, given to several patients in the early stages of what appeared to be *Trichinella* infection, was followed by rapid cessation of symptoms. McNAUGHT *et al.* (p. 159) found phenothiazine to be useless in trichinosis of rats.

LIE KIAN JOE (p. 159) records a case of autoinfection by *Strongyloides*. C II

HAWKING (Frank) *Distribution of Filariasis in Tanganyika Territory East Africa.*—*Ann. Trop. Med. & Parasit.* 1940, Sept. 26, Vol. 34, No. 2, pp. 107-119. With 1 map. [23 refs.]

Filarial literature concerning the Territory and its surroundings is considered, and Hawking's own observations are given.

A great central band of Kenya and Tanganyika Territory, about longitude 36°E, is apparently free from filariasis. The *W. bancrofti* infection lies along a coastal strip including the islands of Pemba, Zanzibar and Mafia with other areas along the western part where the great lakes lie, and yet another in the central area east of the northern part of Lake Nyasa. The *A. persians* infection is in the main distinct in locality west and north of Lake Victoria, but in part mingled with the *W. bancrofti* infection, east of Lake Nyasa. These limitations are presumably the result of the climatic conditions, especially that of temperature that control the distribution of the insect vectors; but there is more in it than this for the Mwanza and Kampala regions have climates that differ but little yet the *W. bancrofti* microfilaria rates are respectively 22.9 and 0, and those for *A. persians* 0 and 46.7. *W. bancrofti* always showed periodicity.

The clinical signs classed as definitely due to Bancroftian filariasis are lymphangitis (a single case) the recurrence of which it is felt cannot certainly be prevented hydrocele (in 10 per cent.) elephantiasis (in 1.8 per cent.) hernia with or without hydrocele (in 2.9 per cent.) Hernia is associated with the infection presumably because the weight of a hydrocele or elephantoid scrotum pulls open the inguinal ring Pyomyositis is fairly common but of its connexion with filariasis there is no evidence. On account of its other possible causes chronic adenitis proved difficult so to associate thickening of the spermatic cord presented the same difficulty Hydrocele and elephantiasis were common lymph scrotum and chyluria occurred in 6 and 2 of 271 cases tabled. Of 362 *Culex fatigans* collected in Dar-es-Salaam 22.3 per cent. were infected, 13.2 per cent. with thoracic forms (usually 1 or 2 in an insect) while 2 (0.6 per cent.) contained mature larvae.

Clayton Lane

HAWKING (Frank) The Transference of *Microfilaria bancrofti* Into Natural and Unnatural Hosts.—*Ann Trop Med & Parasit* 1940 Sept. 26 Vol. 34 No 2 pp 121-129 [10 refs]

These experiments were undertaken in an attempt to decide whether the nocturnal periodicity of *Mf bancrofti* is dependent upon the presence of the adult worms (as suggested by Lane) or not it is considered that the results obtained are not conclusive

After citration blood containing microfilariae was injected into four persons who had none in the blood. In two the embryos promptly disappeared one of them had a double hydrocele Fairley's dirofilaria antigen gave an ambiguous result and the number of microfilariae injected had corresponded to 157 per cc. of the estimated total blood volume the second person came from an area where *W bancrofti* seems absent had no clinical suggestion of filariasis gave an ambiguous antigen reaction and received microfilariae to the estimated amount of 126 per cc. of the total blood volume. In the two others 90 per cent. of the microfilariae disappeared promptly the rest persisted for about 10 days in the third person who had received them to the estimated amount of 126 per cc. of his blood, and who had an ambiguous antigen reaction but they gave no definite evidence of periodicity in the fourth person who had a negative antigen reaction and who received microfilariae to the estimated amount of 350 microfilariae per cc. of his blood, embryos persisted for more than 8 days it being impossible to state whether periodicity persisted. When the microfilarial suspension was injected intravenously into mice to the calculated extent of 5 600 to 3 000 microfilariae to the cc. over 80 per cent. of the larvae disappeared within one hour the rest diminished progressively to zero within 40 hours showed no periodicity (though the sleeping and waking hours of their hosts could not be followed) and in some mice examined histologically larvae were found in the capillaries of the lungs liver and especially of the kidney glomeruli phagocytosis not being seen. A guinea-pig had injections equivalent to about 340 microfilaria in the cc. of its blood an hour later they were estimated at about 20 the two on which the calculation was made being sheathed about 12 hours later the guinea-pig was killed and in about 200 cmm. of blood from venous and heart blood there was one sheathed microfilaria whose nuclei stained poorly and seemed granular Into a monkey the injection

given was to the extent of 140 microfilariae to the cc. of its blood, none was ever found there and there was none in 0.3 cc. of heart blood taken when it was killed 24 hours later. Microfilariae injected intraperitoneally into mice survived for as long as 7½ days, there was accumulation of lymphocytes, monocytes and in one animal of endothelial cells but rarely did cells adhere to embryos and none of the latter passed into the general circulation. After subcutaneous injections of about 7,000 microfilariae into the ears of rabbits and the abdominal wall of rats, none appeared in the blood, but solitary microfilariae were found on scraping the under surface of the skin of the injection sites when the animals were killed 11 to 33 hours later there being no definite phagocytosis.

"It must be concluded therefore, that the evidence of transfusion experiments is inconclusive with a little forcing the results obtained to date can be made to fit either hypothesis." In planning future work "attention should be paid to the following points: (1) the possibility of a latent infection present in the recipient may be diminished by testing his skin-reaction to *Dirofilaria* antigen. (2) the number of microfilariae injected should exceed one million. (3) the waking and sleeping hours of the recipient, subsequent to the transfusion, should be carefully regulated."

C. L.

Hu (Stephen M. K.) Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold. VII. *Culex vorax* Edwards.—Reprinted from *Peking Natural History Bull.* 1938-39 Vol. 13 Pt. 4 pp 287-292. [Henry Lester Institute of Medical Research Collected Papers 1939, Vol. 7 No 16]

1 Of 29 *Culex vorax* experimentally fed on a heavy case of *Wuchereria bancrofti* infection in Shanghai, 21 were found with infective filarial larvae, 1 with dead immature larvae and 7 were negative for the infection when they were dissected after the completion of the incubation period of the parasite.

"2 Of the 21 *Culex vorax* which were harboring infective filarial larvae 5 of them were also found with dead immature stages of the filarial larvae which were more or less chitinized.

3. Extensive chitinization of the infective larvae was found in most of these *Culex vorax*. In only six of them were all the infective larvae unaffected by chitinization.

4 The findings from these *Culex vorax* were quite similar to those from a series of *Culex fuscatus*. Some of the infective larvae were found to be affected by chitinous encapsulation while they were still alive in their mosquito host.

"5 The infective larvae in some batches of *Culex pipiens* var *pallens* and *Culex vagans* which were infected at the same time on the filarial case as these *Culex vorax* were not found to be affected by chitinization.

"6 It appeared that the extensive chitinization of the infective larvae in *Culex vorax* might be likely to influence adversely to some extent the potential role that this species might play as a transmitter of *Wuchereria bancrofti* in the Shanghai area.

HU (Stephen M. K.) Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold. VIII. *Culex bitaeniorhynchus* Giles.—Reprinted from *Peking Natural History Bull* 1939-40 Vol. 14 Pt 1 pp 15-22. [Henry Lester Institute of Medical Research Collected Papers 1939 Vol. 7 No 17]

1 Of 90 *Culex bitaeniorhynchus* experimentally fed on a heavy case of *Wuchereria bancrofti* infection 33 were found harboring filarial larvae.

2 Although time was allowed for the filarial larvae to complete their course of development before the mosquitoes were dissected only 1 of the *Culex bitaeniorhynchus* were found with infective larvae.

3 The rest of the above 33 *Culex bitaeniorhynchus* were harboring only immature filarial larvae which were in most cases found to be dead in the mosquito at the time of dissection. The few immature larvae which were found to be alive in these mosquitoes did not appear likely to be able to complete their development to the infective stage.

4 That the retardation of the development of most of these filarial larvae was not due to seasonal influences was indicated by the finding of infective larvae in some batches of *Culex pipiens* var *pallens* and *Culex vagans* which were infected at the same time as the *Culex bitaeniorhynchus*.

HU (Stephen M. K.) Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold. IX. *Anopheles hyrcanus* var *sinensis* Wiedemann.—Reprinted from *Peking Natural History Bull* 1939-40 Vol. 14 Pt. 2. pp 83-97 [10 refs.] [Henry Lester Institute of Medical Research Collected Papers 1939 Vol. 7 No 18]

1 Of 381 *Anopheles hyrcanus* var *sinensis* fed on a heavy case of *Wuchereria bancrofti* infection and dissected after time had been allowed for the filarial larvae to complete their development to the infective stage, 80 (20.9 per cent.) were found with infective larvae. The average number of infective larvae per mosquito was 3.6

2. When some of the *Anopheles hyrcanus* var *sinensis* were infected on the filarial case together with some *Culex pipiens* var *pallens* and some *Culex vagans* the latter species were found to average a higher percentage of positive infection as well as a larger number of infective larvae per mosquito

3 Of 87 *Anopheles hyrcanus* var *sinensis* collected from a filarial house in Woosung 4 (4.6 per cent) were found with filarial larvae, whereas of 245 *Culex pipiens* var *pallens* collected from this house at the same time 42 (17.2 per cent.) were found with filarial larvae.

KOBAYASI (Hidekazu) On the Development of *Microfilaria bancrofti* in the Body of the Mosquito (*Culex fatigans*)—*Acta Japonica Med. Trop. Formosa*. 1940 Mar Vol. 2. No 1 pp 63-68
With 4 plates & 2 figs. [25 refs.]

A study on the development of *Microfilaria bancrofti* in the mosquito *Culex quinquefasciatus* (*C. fatigans*) was carried out at a room temperature

between May and September 1938. Mosquitoes used in the experiments were bred from larvae in the laboratory the infected ones being kept in metal net cages, fixed on silastic jars filled with water and containing some water plants. The larvae cast off their sheaths in 2 to 6 hours after their passage to the stomach of the mosquito. They penetrate the wall of the stomach and migrate into the body cavity within 4 to 17 hours of infection and shortly after settle down in the thoracic muscles. The larvae usually become mature at room temperature (23.5-27°C.) in 12 to 14 days from infection. Development of the larva can be divided into an embryonal and 3 larval stages by 2 moults. The anterior oesophagus is developed from the primordial cells situated immediately anterior to the nerve ring, and the posterior one from the primordial cell group situated at the middle of the larva. These 2 primordial cell groups are joined together 4 to 5 days after infection. From the beginning of the 2nd moult, cells situated at the posterior end of the oesophagus begin to multiply and form the posterior portion of the posterior oesophagus or 3rd part of the oesophagus. The mid-intestine develops from the primordial cells situated at the rear portion of the primordial cells of the posterior oesophagus. The 4 G-cells are brought closer to each other the G₁-cell divides into 2 cells and the cytoplasm of the G₁-cells fuses together. Liquefaction next occurs and from these changes the rectum is formed. The genital anlage develops from 2 cells that lie on the ventral aspect of the middle portion of the larva, and has no relation with the G₁-cell. Two large oval cells containing numerous gross granules in their cytoplasm may be seen at the end of the 1st larval stage, situated in the ventral aspect of the mid-intestine. No mention of these 2 cells has been made by previous investigators, [but] judging from their shape structure position and development, [they] represent the gland cells. All the cells in the nuclear column lie along the longitudinal axis of the larva, with the exception of the above described primordial cells, and they represent the muscle cells that form the muscular layer of the body wall and the sphincters of the mid-intestine. Shortening and elongation of anatomically fixed points of the larva during its development in the mosquito take place chiefly in the portion between the posterior end of the oesophagus and the anus followed by the portion between the excretory pore and the posterior end of the oesophagus. Changes in size in the remaining parts are rare.

YAO (Y. T.) WU (C. C.) & SUN (C. Jung) Further Study on the Development of Microfilaria of *Wuchereria bancrofti* in Sandflies.—*Far Eastern Assoc. Trop. Med. C. R. Dixième Congrès Hanoi 28 Nov-2 Dec 1938* Vol 2 pp. 753-771 With 6 figs

The authors, in 1938, furnished a preliminary report on this subject [see this *Bulletin* 1939 Vol 38 p 150] and now give a fuller account of much interesting experimental work. They bred *Phlebotomus chinensis* in the laboratory and allowed them to feed on three filarial patients of different degrees of infection, and dissection of them at intervals from $\frac{1}{2}$ to 6 $\frac{1}{2}$ days later showed developmental stages from exsheathed embryos of filaria in the abdominal cavity to post-caecal forms in the thoracic muscles. Similar results, but not quite so favourable followed when laboratory bred *P. argentus* var *mongolensis* were allowed to feed on the same patients. A few (7) *P. kiangsensis* fed on two patients with a lighter infection, and 7 $\frac{1}{2}$ days later five had exsheathed microfilariae in the abdominal cavity and three showed them in the thoracic muscles, but further development was not observed. The number of these was too small for valid deduction but the indication was that *P. bancrofti* was not a suitable intermediate host.

H. H. S.

RADAODY RALAROSY (P) & GUIDONI (P) Un cas d'abcès filarien à localisation inguinale chez un Antaimoro [A Filarial Abscess in the Groin of an Antaimoro]—*Bull Soc Path Exot* 1940 Apr 10 Vol. 33 No 4 pp 292-295

A hard tumour of the size of an almond at the opening of the left inguinal canal contained what seems to have been a female *W bancrofti*.

The man had detected the tumour five days earlier after an attack of high fever and shivering and came to hospital because it interfered with walking. These febrile attacks he had had for some years each attack lasting about four days and being accompanied by itching urticaria like patches in the lower limbs. Under local anaesthesia the easily isolated mass was removed a pedicle which reached up into the iliac fossa having been tied and cut. On section the tumour is described as containing streptococci pus. It seems to have been a dilated and hypertrophied lymphatic vessel in which was a female *Wuchereria bancrofti* containing outstretched embryos the contents of the other part of the genital tube being degenerate. It lay in a mass of leucocytes and fibrin the inner part of the surrounding wall being necrotic
C L

HAWKING (Frank) Two Cases of Chyluria.—*Jl Trop Med & Hyg* 1940 Aug 15 Vol. 43 No 16 pp 218-221 With 2 figs

Of the two chyluria cases described one passed chylous urine throughout the 24 hours and had no microfilariae in blood or urine the amount of fat in the urine was increased by giving butter liberally. Charts of the second show a microfilarial blood tide with its crest about 2 a.m. and with complete absence of larvae by day the urine showed a diurnal periodicity microfilariae making their appearance about 6 a.m. reaching their greatest numbers about 6 p.m. after which these fell abruptly. The curves of protein and red cells were similarly timed that of fat less closely so. As just noted the numbers of microfilariae in blood and urine give sharply dissimilar curves those in the urine are usually 20 to 30 times greater than in the capillaries, judging by comparison of microfilarial and erythrocyte numbers in each. These facts point either to extensive destruction of the red cells in the urine or to something other than capillary haemorrhage bringing them there the latter view is strengthened by the observation that the leucocytes in the urine were all lymphocytes with no polymorphs. In this case the chyluria ceased spontaneously a pointer to the difficulty of assessing the real significance of the various cures claimed.
C L

HAWKING (Frank) Chemotherapy of Filariasis *in vivo* and *in vitro* — *Jl Trop Med & Hyg* 1940 Aug 1 Vol. 43 No 15 pp 204-207

The following substances were administered to patients with filariae (*W bancrofti*) Fouadin anthiomaline tartar emetic neoarsphenamine, acetylarsan, espondal arsant emetine sulphanilamide 4 4-diammodiphenyl-sulphone glucoside. No filaricidal action could be demonstrated.

The *in vitro* experiments covered 35 substances tested upon *Mf bancrofti* at 37°C for 20 hours. Only the arsenicals and tartar emetic were effective and even then only in concentrations greater than are possible in the blood of living animals. The advantages of *in vitro*

experiments are the testing of many substances in a short time, the possibility of grading filaricidal effects, and the elimination of risks to a patient. A minor disadvantage is the midnight hour at which the test has to be set up the essential disadvantage is that [as may be the case with intestinal anthelmintics] the drug administered is not the actual anthelmintic but is turned into this by the body or as Hawking puts it, "many important compounds, e.g. trypanamide, Bayer 205 and sulphadiazide (to some extent) do not manifest *in vitro* their specific activities upon the organisms against which they are effective *in vivo*." He therefore regards the discovery of a laboratory animal, small, cheap and filaria-carrying upon which drugs could be tested as offering the most chances of success. If a laboratory infestation, suitable for chemotherapeutic research were once made available it would seem (judging by our experience with laboratory infections of trypanosomes malaria and streptococci) that the discovery of a potent filaricidal substance would be only a matter of time. C. L.

DASABAYAKE (W. L. P.) *Filaria* Survey in Galle Town.—*J. Trop. Med. & Hyg.* 1940 May 15 Vol. 43. No. 10 pp. 133-135

A survey including analysis of 150 clinical cases and a blood survey of 1,840 persons, about 5 per cent of the population of the town.

Of the blood slides 10 per cent had microfilariae their rate varying locally from 1.3 to 23 per cent. Of 189 positive slides 88 contained *Mf. malayi* and 91 *Mf. bancrofti*. *Mansonella* species especially *Mf. uniformis* are reported as common in localities with the *Mf. malayi* infection and *C. fatigans* in those with *Mf. bancrofti* type. C. L.

RAO (S. Sander) & MAPLESTONE (P. A.) The Adult of *Microfilaria malayi* Brug., 1927.—*Indian Med. Gaz.* 1940 Mar Vol. 75 No. 3 pp. 159-160 With 2 figs.

This worm is practically identical with *M. bancrofti* in nearly all its characters. The females are quite indistinguishable.

In the case of the males we have had the opportunity over the past few years of examining five or six adult male *M. bancrofti* and are quite satisfied that they possess nine pedunculated caudal papillae and narrow caudal alae, but there is a good deal of evidence that these structures show some variation. On account of the discrepancies in the description of the male *M. bancrofti* which Maplestone (1929) discussed, it is probable that the present worm might be considered identical with it, but as we have had the opportunity of comparing the two side by side we are able to distinguish the difference in the tail papillae. Also the spicules of the new species are of the same general characteristics, but when seen side by side it is obvious that those of the new species are much more delicate than those of *M. bancrofti* and they also lack the distinct transverse corrugations on the stout portion of the spicules seen in *M. bancrofti*.

These differences are so slight that alone they might be considered insufficient on which to base a new species, but in addition to them there are the differences in the microfilariae which have been recognized for many years and the fact that the insect host appears to be always *Mansonoides anisalis* whereas *M. bancrofti* is known to develop chiefly in *Culex fatigans*. It is accordingly proposed to name the worm *M. malayi* n. sp. following the name given to the microfilaria by its discoverer.

[The valid name of this species has been *malayi* since Brug. so designated it on discovery of the microfilaria (Articles 25 and 27b of the Code of Zoological Nomenclature). The removal of the species

from the genus *Filaria* in which BRUG placed it, to the genus *Wuchereria* has in no way affected the validity of BRUG's specific name *Filaria malayi* Brug 1927 merely becomes *Wuchereria malayi* (Brug 1927) or when it is desirable to indicate the authors of the new combination, *Wuchereria malayi* (Brug 1927) RAO and MAPLESTONE 1940. No new species has been created. It is still Brug's.] C L

FEDERATED MALAY STATES. ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR 1938.—The Transmission of *Microfilaria malayi* pp 64-68 [HODGKIN (E. P.)] Filariasis pp 80-85 [POYNTON (J. O.)]

The essential factor for the efficient transmission of *Mf malayi* is undoubtedly the presence of large numbers of *Mansonia* principally *M longipalpis* which in turn is dependent on the proximity of extensive uncultivated fresh water swamps within which the larvae obtain their oxygen supply from the roots of trees. Other species of *Mansonia* play a part in transmission and, if present in sufficient numbers might alone be responsible for endemic filariasis. Such conditions have not, however been encountered.

The number of *M longipalpis* captured in two localities was 6 923 about three-quarters of the total bag of *Mansonia* and *Anopheles* species listed. The percentages of the two collections of *M longipalpis* which were infected with *Microfilaria malayi* were 0.86 and 0.56 for immature and 0.72 and 0.89 for mature forms. Two other *Mansonia* species were found infected namely *M indiana* with 3 immature and 1 mature infection in 603 examinations and *M uniformis* with 5 immature and 1 mature infection in 1 287 insects. But the possible risk from the prevalent *M longipalpis* is shown by its capacity for infection for when deliberately fed on carriers its percentage of infection was 96.62, a rate not far from that of the relatively scarce *M annulata* *M annulifera* and *M uniformis* but considerably above that of *M indiana*. Again when 72 *M longipalpis* and 259 *M uniformis* were fed on *Macaca irus* infected with a microfilaria identified as *Mf malayi* the respective infection rates were 79.2 and 84.2. Blood films from Malaysians in several districts showed infection varying from 14 to over 50 per cent. As to treatment, the need of caution in appraisement is stressed but the evidence is that injection of drugs into enlarged inguinal lymph glands and the surrounding muscle is effective in reducing or stopping febrile attacks and thus in slowing or arresting the development of elephantiasis. One report received has dealt with such injections of 1 cc. of 1 per cent mercury cyanide a second with anthiomaline and a third with intravenous Mapharside. All reports are favourable though at present with insufficient detail. Fouadin was found to be very painful when injected into the glands. C L

MEYER (M. A. U.) A Description and Comparative Study of the Fourth Instar Larvae of *Mansonia* (*Mansonioides*) *uniformis* (Theobald) and *Mansonia* (*Mansonioides*) *annulifera* (Theobald) including a Synoptic Table for the Identification of the Larvae of the Indian Species of the Subgenus *Mansonioides* Theobald, 1907 (Diptera, Culicidae). — *Jl Malaria Inst of India* 1940 June Vol. 3 No 1 pp 179-184 With 3 plates.

ROMITI (Cesare) Note on Dr Knott's Paper on Filariasis of the Testicle — *Trans Roy Soc Trop Med & Hyg* 1940 Apr 30 Vol 33 No 6 pp 653-654 With 1 plate

McMAHON (J. P.) *Onchocerca volvulus* and its Vector in the South Kavirondo Districts of Kenya.—*Trans Roy Soc. Trop Med. & Hyg.* 1940 June 27 Vol. 34. No. 1 pp. 65-83. With 3 maps in text & 8 figs. on 2 plates. [12 refs.]

The author recalls that *O. volvulus* infection was found in 1933 in the Kavirondo district of Kenya. He now records the results of a preliminary investigation of part of the S. Kavirondo district. The altitude varies between 4,000 and 5,000 feet and the area is well watered by two rivers. The climate is equable, with an average rainfall of about 60 inches. The population is dense, and consists of the Luo (Nilotic) and the Kisu (Bantu) tribes. The daily vocations of the people constantly bring them into close contact with the rivers. It is interesting to note that one section of the population left an endemic area for fear of contracting the disease. Skin snips of 805 people (men, women and children) were examined. 309 (51 per cent.) were positive for *O. volvulus*. The general adult rate (60 per cent.) is, as one might expect, higher than the rate in childhood (43 per cent.) and the male rate is higher than the female. Children may become infected at the age of 4 years or earlier, but unfortunately children in arms were not available for examination.

Adult *Simulium* were collected in the bush along the rivers, and pupae in all parts of the rivers. A total of 1,369 female flies was collected and with the exception of one specimen of *S. dentulosum* Roubaud, all were *S. nearcticum*. The density of fly varied with density of bush and with shade and the resulting humidity, but food supplies must, of course, constitute an attraction. The author dissected 557 flies and recorded the results as positive or negative. 49 were positive. No attempt was made to ascertain the seat of infection, whether proboscis, thorax or stomach. Highest infectivity rates were found in lowest fly densities. When the fly migrates to comparatively open country it is much more closely in contact with human population and consequently is more liable to become infected, but as a rule the flies are reluctant to leave the dense riverine bush. In the upper reaches of one of the rivers only two flies were caught, but both were infected with *O. volvulus* owing probably to the close contact with human population.

In regions of high fly density a high incidence of human onchocerciasis was found to exist and in regions of low fly density a corresponding drop in the degree of infection was evident. The region of lowest infection was at a point, 1½ miles from the river where the people draw their domestic water supply from a small sunlit stream, and where the country is free from bush.

It was found that dense thicket was not attractive to the flies, but that on a dull day they will travel to a maximum of 700 yards from their breeding grounds through light bush. Shade as one would expect was made use of by the flies. No single *Simulium* adult fly was found inside the huts.

S. nearcticum were released into cages containing rabbits, guinea-pigs, and rats for the purpose of infecting these animals. All the flies were apparently reluctant to feed as they were always seen to be resting on the sides of the cages.

A survey of the rivers and tributaries resulted in the finding of larvae and pupae of 8 species of *Simulium* but not those of *S. nearcticum* in spite of the fact that this was by far the commonest adult found.

Francis G. Wilcocks.

ANDERSON (C) & LEHUCHER (P) Premier cas d'onchocercose cutanée observé en Tunisie. [The First Case of Cutaneous Onchocerca Infection seen in Tunisia.]—*Arch Inst Pasteur de Tunis* 1940 Mar Vol. 29 No 1 pp 105-112. With 3 figs.

This report of Onchocerca infection comes from La Goulette a small fishing village in Tunisia. The observations date from 1928 For preliminary note see this *Bulletin* 1939 Vol. 38 p 155

A lad of 15 had skin irritation at night and had had for 4 years a tumour as big as a nut [noix ? walnut] on the right thenar eminence. It was cut out and found to consist of two distinct masses each as big as a chick pea and on teasing out there were present here and there coiling filaments and, in the connective tissue microfilariae 300 μ long by 6 to 7 μ wide without sheath or dart. The worm had a white thick striated cuticle and some bits had annular thickenings. The lad had been inland at Ain Draham and Tabarka on occasions. Simulium has been found variously identified as *S. lineatum* and *S. reptans*. The irrigation arrangements are figured and that of an onchocerca nodule perhaps refers to this case although the paper deals also generally with the infection. C L

LEVY (A H) A Case of Bilateral Keratitis and Cyclitis due to Filaria (*Onchocerca volvulus*) Infection in a European from Kenya.—*Proc Roy Soc Med* 1939 Oct Vol. 32. No 12. pp 1620-1621 (Sect Ophthalmology pp 80-81)

The patient had lived in the Kakamega district of Kenya for ten years was seen in 1937 with conjunctivitis and a high eosinophilia and in 1939 with keratitis and cyclitis. He had no nodules and frequent and careful examinations with the slit lamp showed no microfilariae. Atropine drops and hot bathing relieved the symptoms. C L

SKIRIABIN (K) Invasions à filarides chez l'homme en l'URSS [Human Filariasis in U.S.S.R.]—*Med Parasit & Parasitic Dis* Moscow 1940 Vol. 9 No 1-2. [In Russian pp 119-127 With 4 figs. [14 refs.] French summary p 127]

Loa extraocularis has been recorded 8 times in the U.S.S.R. infection always being by an immature female man being evidently a non-optimum host. Study is needed to determine its optimum host. C L

DESPORTES (C) *Filaria conjunctivae* Addario 1885 parasite accidentel de l'homme est un *Dirofilaria* [*F. conjunctivae* an Accidental Parasite of Man is a *Dirofilaria*]—*Ann Parasit Humaine et Comparée* 1939-1940 Vol. 17 Nos. 5 & 6 pp 380-404 515-532 With 5 figs. [Bibliography]

The material came from a tumour the size of a hazel nut in the left submammary groove of a Corsican girl of 14. The worm 116 mm. long and 0.47 mm. wide is pictured and identified as a *Dirofilaria*. Twenty three species of the genus are considered and 19 are grouped though not designated as subgenera, *Filaria conjunctivae* with which this specimen is identified, being placed in the group containing *D. repens*. C L

STEFANOPOULO (G. J.) & DANIAUD (J.) Réaction de fixation du complément et intradermo-réaction au cours de la filariose humaine à *D. medinensis* [Complement Fixation and Intradermal Reactions in Infection with *D. medinensis*.]—*Bull. Soc. Path. Exot.* 1940. Mar. 13. Vol. 33. No. 3. pp. 149-153. With 5 figs. on 2 plates. [13 refs.]

These reactions were positive for one to two months after cure.

The antigen was obtained from *Dirofilaria immitis*. The table covers ten persons and shows that complement fixation was classed as +++ for two months after cure, by four months it was --+ and after that either the same or ---. The intradermal reaction was positive in the seven cases in which it was tested, up to 8 months after cure. Eosinophilia in seven cases tested lay between 4 and 32, the gel test, made in five cases, was clear in two, opaque in two and doubtfully clear in one. There were no microfilariae in the blood. Nearly all the patients came from the French Niger where other filariae are practically absent. C. L.

KUTTUNX ERBAUM (E.) The Incidence of Enterobiasis in Children in a Convalescent Home in Toronto.—*Canadian Public Health J.* 1940. June. Vol. 31. No. 6. pp. 287-290.

"In the I.O.D.E. Preventorium Convalescent Home 140 children 2 to 14 years of age were examined for *Enterobius vermicularis*. The NIH swab, with 37 swabs taken per child, disclosed 83 children or 70 per cent of those examined, positive for enterobiasis."

GRANCO (Pedro P.) Jr & SORIANO (Lily J.) The Incidence of *Enterobius vermicularis* among Filipino School Children: a Preliminary Report.—*Acta Med. Philippina*. Manila. 1939. July-Sept. Vol. 1. No. 1. pp. 81-86. 14 refs.]

"The incidence of *enterobius vermicularis* parasitism among Filipino school children in a district of Manila (Paco District) with the use of the cellophane-swab method is given as 75.2 per cent."

SAWITZ (Willi) Comparison of Methods used in the Diagnosis of Oxyuriasis.—*Rev. Med. Trop. v. Parasit.* Habana. 1940. Mar-Apr. Vol. 6. No. 2. pp. 75-78. With 1 fig.

The report deals with 482 children at 6 Charity Homes examined by means of the NIH swab. Of them 358 (74.3 per cent) in all were found positive for enterobius. A single NIH swab examination detected 65.9 per cent and showed supernumeries of 163 to 1 over direct faecal film, of 4.6 to 1 over brine centrifugal floatation, and of 4.2 to 1 over zinc sulphate centrifugal floatation. Additional swab examinations raised the positive percentages to the following figures: second examination to 79.9, third to 87.2, fourth to 90.2, fifth to 93.9, sixth to 98, seventh to 99.4. Zinc sulphate floatation gave 2 more and raised the percentage to 100. C. L.

D'ANTONI (Joseph S.) & SAWITZ (Willi) The Treatment of Oxyuriasis.—*Am. J. Trop. Med.* 1940. May. Vol. 20. No. 3. pp. 377-388. With 2 figs.

A study undertaken to determine the efficacy of gentian violet in ridding children of threadworms in three institutions in New Orleans.

Diagnosis was by the NIH swab freedom from infection being admitted only when seven consecutive examinations had been negative. Treatment was by half-gram tablets of gentian violet of a kind said to dissolve in the caecum.

One institution with 58 inmates showed 38 per cent. of infections. After 6 weeks of rigid hygienic measures in this institution already scrupulously clean infection had increased 13 per cent. These measures were

Two extra housemaids cleaned every room with hot soap and water daily. The children wore short cotton pants during the night, these shorts being changed and sterilized daily. Bed sheets were changed and sterilized daily. Underwear was changed daily and sent to the laundry. Nail brushes were provided for each child and their use enforced. Two showers were taken daily instead of one.

In the other two institutions 97 per cent. of 122 boys and 81 per cent. of 28 girls were found infected. The treatment was from 0.5 grains 3 times a day to courses of 1 gram 3 times a day for 5 to 8 days with repetitions of courses. Cure rate was 90 per cent. Vomiting was prevalent but did not follow actual dosing. Treatment has then proved more satisfactory than efforts at prevention. C. L.

CATRON (Lloyd) The Incidence of Trichinosis In 300 Autopsies at the University Hospital, Ann Arbor Michigan.—*Amer Jl Hyg* 1940 July Vol 32 No 1 Sect. D pp 12-23 [34 refs.]

In these 300 routine autopsies the percentage of *Trichinella* infection was 14.7. None of them had given a history suggestive of the infection.

All the 44 infections were disclosed on digestion of 50 gm. or less of diaphragm by pepsin and hydrochloric acid. 8 when the amount of muscle was 1 gm. 3 when a single squash preparation of ground up diaphragmatic muscle was microscopically examined. While such digestion showed up all persons in whom infection was detected it was useless in estimating the weight of infection since in this process dead and calcified measles are dissolved. C. L.

TERRY (L. L.) & WORK (J. L.) Trichinosis of the Myocardium. Report of a Case, with Autopsy Findings.—*Amer Heart Jl* 1940 Apr Vol. 19 pp 478-485 With 4 illustrations.

A rapidly fatal case of trichinosis with myocardial involvement was mistaken for rheumatic fever.

This woman of 20 came to hospital unable to walk for pain and swelling in feet and ankles having as it transpired later eaten uncooked smoked ham shortly before her illness began while earlier in the illness she had had a generalized itching eruption. In the blood the red cells numbered 4,180,000 white cells 15,800 eosinophils 1 per cent. haemoglobin 12.5 gm. (Sahli) blood could be got from a puncture wound for 45 minutes and she had purpura. An electrocardiogram which was taken on the sixth hospital day revealed low voltage of the Q R S complexes in all three conventional leads. The T waves were barely visible in fact they were definitely identified in Lead II only. The P R interval was 0.28 second. The temperature reached 40.5°C. She died on the 8th day after admission to hospital the 28th day of her illness. After death the pectorals showed numerous larvae between and within hyalinized muscle fibres with reticulo-endothelial cell

surrounds. The heart muscle fibres were fragmented with focal necroses surrounded in a few by cell masses, in several showing half coiled embryos. Pectoral muscle from the patient which had been preserved in 10 per cent. formalin for two weeks was digested and about 250 larvae obtained from 10 gm. of tissue. Except for the blocks saved for microscopic study the entire heart which also had been fixed, was similarly examined, but no parasites were found."

C L.

LYSTER (L. L.) On the Use of Commercial Papain for the Digestion of Trichinosed Meat.—*Canadian Jl Comp Med* Gardenvale Quebec. 1940 Mar Vol 4 No. 3 pp. 73-75

Commercial papain was found satisfactory in digesting out *Trichinella* cysts for microscopic diagnosis and as a basis for antigen reactions.

The condition needed for satisfactory digestion is the use of 0.1 gm. of papain in 313 cc. of normal saline to digest 100 gm. of tissue. Digestion is complete in 38 hours though some free larvae are seen in 24 hours. For antigen skin reaction there were compared coon extracts, prepared by Bachman's method [this *Bulletin* 1929 Vol 26, p. 551] of larvae secured by peptic and by papain digestion. On pig's skin both gave uncertain results on that of man the reactions were identical with that of the accepted antigen. In precipitin tests the papain extract gave definite but less pronounced reactions than did the papain extract

C L.

ANDES (Jerome E.) GREENE (Robert A.) & BREAZEALE (Edward L.) Early Mild Infestation with the Parasite *Trichinella spiralis* Report of Ten Cases.—*Jl Amer Med Assoc* 1940 June 8. Vol 114 No 23. pp 2271-2275

Tetrachlorethylene was given in the earlier days of their illnesses to persons suffering from what had the appearance of an epidemic of trichinosis. It merits note that this treatment stopped symptoms.

1 Of ten patients believed to have been infested with *Trichinella spiralis*, all but one gave a history of eating pork from one to three days before the onset

2 The condition of eight of these patients was diagnosed within the first three days of the onset. The most common symptoms were malaise, abdominal discomfort, fever, headache and edema around the eyes. All showed a definite eosinophilia and all tested gave a positive skin reaction with trichinella antigen. Administration of tetrachlorethylene was followed by complete and immediate recovery.

3 The two patients consulting us six and seven days after the onset contracted muscle pain and tenderness. patient 3 showed a fairly long drawn out convalescence.

4 The eosinophil content of the blood was shown to rise continually during the day, being highest in the evening.

C L.

[The patients were connected with a University and would have reported any recrudescence of symptoms. They were re-examined at periods varying from 6 days to 5½ weeks after completion of treatment, except in the case of one man but were then found to be healthy. The authors do not claim that the drug cured the condition, though it may have done so they merely record the cessation of symptoms.—Ed.]

McNAUGHT (James B) BEARD (Rodney R.) & DEEDS (Floyd)
Further Observations of Phenothiazine in Experimental Trichinosis.
—Proc Soc Experim Biol & Med 1939 Nov Vol. 42.
 No 2. pp 645-648.

Further experiment [see this *Bulletin* 1940 Vol. 37 p 309] has shown that phenothiazine has no value in the control of experimental trichinosis in rats. There seems to be a sex variation in susceptibility to trichinosis female rats being more resistant than the males.

C L

LIE KIAN JOE Automfectie bij Strongyloidiasis als vermoedelijke doodsoorzaak [Autoinfection with Strongyloides as a probable Cause of Death.]—*Geneesk Tijdschr v Nederl Indië*. 1940 Oct. 22. Vol. 80 No 43 pp 2550-2553 English summary

A case of hyperinfection with Strongyloides in a Japanese fisherman. Tremendous numbers of rhabditiform larvae in freshly obtained duodenal contents and vomited material and a certain number of filariform larvae besides. In the stools rhabditiform larvae in enormous quantities. The size of the filariform larvae from the stomach and duodenum (seen by direct observation) was equal to the size of the filariform larvae obtained by culture from the faeces. For this reason they cannot be explained as larvae, which had already passed the lung. Permission for autopsy could not be obtained.

RABIES

A REVIEW OF RECENT ARTICLES XXXIV*

1. *Virus*

A strain of rabies virus isolated from a jackal has been examined by VEERARAGHAVAN and PHILIPSE and has been found to be pathogenic for domestic fowls. In the original fowl passage the incubation period was 29 days whereas after 15 passages it remained fixed at 2 days. Negri bodies at first numerous became greatly reduced in number and in size. This fixed strain was highly pathogenic to rabbits and guinea pigs. On the other hand fowls inoculated with the strain of Paris fixed virus which is used in India developed rabies only after very protracted incubations (8 and 11 months). A brief description of the Negri bodies is appended.

The comparative susceptibility of 10 different strains of mice to rabies virus has been examined by JOHNSON and LEACH². Two strains of virus were employed one of human origin which had been passed intracerebrally through 5 mice the other from a dog which had

* For the thirty third of this series see this *Bulletin* 1940 Vol. 37 p 614

¹ VEERARAGHAVAN (N) & PHILIPSE (G. L. C.) The Susceptibility of Domestic Fowls to a Strain of Rabies Virus obtained from a Jackal.—*Indian J Med Res* 1940 July Vol. 28. No. 1 pp 81-90 With 2 plates.

² JOHNSON (Harold N) & LEACH (Charles N) Comparative Susceptibility of Different Strains of Mice to Rabies Virus.—*Amer J Hyg* 1940 Sept. Vol. 32. No. 2. Sect. B pp 38-45 [10 refs.]

exhibited symptoms of furious rabies. No essential differences were observed between the various mice strains.

CASALS³ shows that younger mice (7-9 days) are more susceptible than older mice to fixed or street virus administered by any route that 20-day-old mice are more susceptible than 60-day-old mice to peripheral, but not intracerebral, injection of fixed virus that 20- and 60-day-old mice are equally susceptible to street virus. Our own experiments indicate that age differences in susceptibility to street virus are not specially noteworthy but do develop with fixed virus which has been passed artificially from animal to animal."

The influence of water vapour on dried rabies virus has been investigated by REMLINGER and BAILLY⁴. It appears that whereas the dry powder preserves its virulence over a period of many months when the least trace of water vapour is present loss takes place in a few weeks. They believe that loss of virulence is due not to a combined action of heat oxygen and desiccation, but to the action of some proteolytic property which acts only in the presence of water.

A fatal bovine pruritic syndrome which resembles pseudo-rabies has on rare occasions been observed in Illinois (U.S.A.). GRAHAM MORRILL and BOLEY⁵ now report that they have isolated a filterable virus from the brain of a steer which exhibited symptoms of this complaint. Inoculation experiments with both unfiltered and filtered virus induced the appropriate symptoms in guinea-pigs the virus grew on the chorio-allantoic membrane of the chick. Cross immunity tests were conducted by SNOW and supported the deduction that the virus was that of pseudo-rabies.

ii. Diagnosis

Various points in the diagnosis of rabies by inoculation of mice are discussed by WILLETT and SULKIN⁶. From comparative experiments they found that the white mouse is more susceptible to rabies virus than is the guinea-pig. Thus of 104 white mice 10 (9.3 per cent.) survived whilst of 54 guinea-pigs 24 (44.4 per cent.) survived. Also the average incubation period in the mice was 13.6 days, whereas in the guinea-pigs it was 18.4 days. It seemed that Swiss mice did not differ materially from mice belonging to a stock which originated in St. Louis. The authors consider that the demonstration of Negri bodies in the inoculated animal is essential for a positive diagnosis. They find that the bodies appear in the mouse's brain before the 8th day and that for rapid diagnosis the animal may be sacrificed at this period. They recommend either in 10 per cent concentration for the sterilization of contaminated brains.

³ CASALS (J.) Influence of Age Factors on Susceptibility of Mice to Rabies Virus.—*J. Experim. Med.* 1940 Oct 1 Vol 72 No 4 pp 445-451 With 2 figs.

REMLINGER (Paul) & BAILLY (Jacques) Influence de la vapeur d'eau sur l'activité des poudres de virus rabique.—*C. R. Acad. Sci.* 1940 May 8 Vol 210 No 19 pp 683-684.

⁵ GRAHAM (Robert) MORRILL (C. C.) & BOLEY (L. E.) Bovine Pseudorabies or Mad Itch Virus.—*Science* 1940 June 28 Vol 91 No 2374 pp 623-624.

⁶ WILLETT (Joseph C.) & SULKIN (S. Edward) Improved Methods in the Diagnosis of Rabies.—*J. Amer. Vet. Med. Assoc.* 1939 Dec Vol 95 No 753 pp 656-662 With 4 figs.

Using Mallory's stain BLACK⁷ finds that adjustment of the pH of the eosin to 3 and buffering the methylene blue to a pH of 5 improves the method. He was able to demonstrate Negri bodies in a greater percentage of cases (which had been proved to contain virus by Webster's mouse test) than when the ordinary reagents were used. He discusses the nature of the Negri body and states that the small Negri body containing a single internal basophilic granule the intra nuclear inclusion of poliomyelitis and the nucleoli of certain neuroglia cells particularly in small animals are identical in size shape, contour staining reaction and granular content. Nucleoli of certain neuroglia cells are frequently confused with small Negri bodies particularly in smear preparations. Evidence indicates that many so-called virus inclusions are actually metabolic responses of the nucleus and are not degenerative products of the cell. The special staining methods do not show that the Negri body is a degenerative product of the cell.

iii. Pathology

The distribution of the rabies virus in the brain of a 55-year-old man who died of rabies two months after a bite on the hand has been examined by SABIN and RUCHMAN.⁸ The virus was not found at the site of the bite but was present in appreciable amounts in the cervical cord and medulla the cornu ammonis and the olfactory bulbs. The patient had received no treatment.

iv. Methods of Treatment and Statistics

It will be remembered [this *Bulletin* 1935 Vol 32, p 607] that SANKARAN and BEER found that ultra violet rays from a quartz mercury vapour lamp inactivated rabies virus and that they stated that experiments were in progress to determine whether the inactivated virus retained its antigenic properties. The reviewer is unaware of the results of these experiments but the lacuna is now filled up by HODES WEBSTER and LAVIN.⁹ They find that tissue culture rabies virus loses its virulence under the action of ultra violet rays from a quartz mercury vapour lamp (as also from a mercury resonance lamp) thus confirming the result of SANKARAN and BEER and further from experiments relating to 60 treated and 21 untreated mice that a considerable degree of protection can be attained from culture virus vaccine which has been irradiated for 35 minutes.

The mouse test of WEBSTER for determining the immunizing power of anti-rabies vaccines has been referred to on many occasions in these reviews. Those interested will find in the Public Health Reports an excellent and thorough *résumé* by HABEL¹⁰ of the experiments which have been carried out in America by WEBSTER and his collaborators.

⁷ BLACK (Charles E.) Interpretations of Neurotropic Virus Cell Inclusions, with Special Reference to the Negri Body.—*Jl. Infect Dis* 1940 July-Aug Vol. 67 No. 1 pp 42-47 With 3 figs. [19 refs.]

⁸ SABIN (Albert B.) & RUCHMAN (Isaac) Spread of Virus in an Unvaccinated Case of Human Rabies.—*Proc Soc Experim Biol. & Med* 1940 June Vol 44 No 2, pp 572-577

⁹ HODES (H. L.) WEBSTER (L. T.) & LAVIN (G. I.) The Use of Ultraviolet Light in preparing a Non Virulent Antirabies Vaccine.—*Jl. Experim Med* 1940 Oct. 1 Vol 72, No. 4 pp 437-444 With 1 fig

¹⁰ HABEL (Karl) Evaluation of a Mouse Test for the Standardization of the Immunizing Power of Anti Rabies Vaccines.—*Public Health Rep* 1940 Aug 16 Vol. 55 No. 33 pp 1473-1487 [10 refs.]

The influence of age on the immunizability of mice to rabies virus has been examined by CASALS¹¹. It appears from his experiments that mice more than 60 days old are more readily immunizable than mice less than 20 days of age. The titre of circulating neutralizing antibodies does not parallel the titre of immunity.

A dog test for measuring the immunizing potency of vaccines after the pattern of the mouse test previously described by WEBSTER has been examined by WEBSTER and CASALS¹². The infecting dose was given into the muscles of the neck, and the animals were young beagle dogs. There was a strong parallelism between the results in dogs and in those previously reported in mice. The best results were obtained from chloroform vaccines administered intraperitoneally.

Experiments on the protective power of various vaccines have been carried out by DODIERO¹³. The general results are as follows. In the case of pre-infectious immunization treatment by dried cords protected 72 to 86.8 per cent of rabbits, treatment by phenol vaccine (5 per cent, incubated 24 hours at 37°C.) protected 42 to 69 per cent., and treatment by formol vaccine (incubated for 8 days at 37°C.) protected 66 to 86.6 per cent. In the case of post-infectious treatment, dried cord vaccine protected 30 to 50 per cent, phenol vaccine protected 15 per cent and formol vaccine afforded no protection. [The data are not in a form from which statistical inferences can be drawn.]

A series of experiments on the immunizing properties of 31 strains of fixed virus, 28 of which are now in use for the manufacture of rabies vaccine in America and other countries has been carried out by HABEL¹⁴. Twenty-five of these were derived from the original Pasteur strain others were isolated in Budapest, Texas, the Rockefeller Institute and Alabama. The immunizing potency of strains seemed to be related to their ability to resist phenol, to the rapidity of their passage transfer and possibly to the length of the incubation period in rabbits. It was not related to the degree of removal from street virus, resistance to glycerine or to the species of animal through which it was transmitted. "The need of establishing a strain of high immunogenic value for use in manufacturing rabies vaccines for human and animal use is obvious. Work directed towards the determination of how to build up and maintain the immunizing value of a fixed rabies virus strain is in progress and will be published at a later date."

A series of tests has been carried out by WYCKOFF and BECK¹⁵ with the object of testing the conclusions arrived at by WEBSTER [this *Bulletin* 1940 Vol 37 pp 194 and 619] with regard to the immunizing

¹¹ CASALS (J.) Influence of Age Factors on Immunizability of Mice to Rabies Virus—*Jl. Experim Med.* 1940 Oct. 1 Vol. 72, No. 4 pp. 453-461 With 1 fig.

¹² WEBSTER (Leslie T.) & CASALS (J.) A Dog Test for measuring the Immunizing Potency of Antirabies Vaccines—*Jl. Experim Med.* 1940 May 1 Vol. 71 No. 5 pp. 719-730 With 1 plate.

¹³ DODIERO (J.) Valeur expérimentale pour le lapin de quelques vaccins antirabiques—*Fer Eastern Assoc Trop Med C R. Disinfect Congrès Hanoi* 26 Nov-2 Dec 1938 Vol. 2 pp. 373-384.

¹⁴ HABEL (Karl) Factors influencing the Efficacy of Phenolized Rabies Vaccines. I. Strains of Fixed Virus—*Public Health Rep.* 1940 Sept. 6 Vol. 65 No. 36 pp. 1618-1631 With 4 figs. [17 refs.]

¹⁵ WYCKOFF (Ralph W. G.) & BECK (C. E.) The Potency of Anti-Rabies Vaccines—*Jl. Immunology* 1940 July Vol. 39 No. 1 pp. 17-23.

potencies of various antirabic vaccines now in the American market. On the whole our results agree well with those published by WEBSTER. Both suggest that much of the vaccine now being sold has little antigenic value and both demonstrate the variation that exists in different batches of a single manufacturer. The results are based upon the WEBSTER mouse test.

With the object of testing the truth of VAN STOCKUM'S assertion [thus *Bulletin* 1935 Vol. 32 p 612] that the success of treatment can be assessed by the comparative absence of deaths with incubation periods greater than 30 days, BOECKER¹⁶ analyses the statistics relating to 151 cases of rabies in European persons who had *not* received treatment. These occurred in Germany during the years 1895-1933 and may be distributed as follows —

Duration in days from infection to death

	0-33	33-64	64-93	94-123	124-153	153	Total
Head and neck	11	2	24	5	1	0	43
Hand and arm	12	3	26	16	9	0	70
Body and leg	1	0	7	7	3	0	18
No record	1	1	7	6	3	0	18
Total	25	6	64	34	16	0	151
Percentage	16.5	4	42	22.5	11	0	100

In the second forthcoming section of this communication Boecker intends to analyse the statistics of persons treated during the same period and under similar conditions. The author discusses results arrived at by other workers but the interest lies chiefly in the above table and in the corresponding table regarding treated persons which he promises.

The history of antirabic vaccination in Turkey is described by BAECHER¹⁷. The first director was ZOEROS PASHA and treatment was inaugurated by him in 1892. It will be remembered that REMLINGER carried out much of his earlier work in Constantinople as director during the years 1896 to 1911. The method of treatment originally employed was that of Pasteur. In 1917 that of Hogenes was introduced, and in 1938 this was replaced in certain Turkish institutes by that of Semple.

A statistical summary of antirabies treatment at the Pasteur Institute at Vienna from 1927 to 1938 is presented by PIRINGER¹⁸. The statistics are discussed under the headings adopted at the Paris Conference. During the earlier years the method of treatment was

¹⁶ BOECKER (Eduard). Inkubationszeiten und Lebensfristen bei der menschlichen Tollwut und ihre Auswertung bei der Beurteilung von Wutschutzbehandlungsverfahren. I. Mitteilung—*Ztschr f Hyg u Infektionskr* 1940 Apr 7 Vol. 122 No 4 pp 387-405.

¹⁷ BAECHER (Stephan). Die Wutschutzimpfung in der Türkei—*Türkische Ztschr f Hyg u Experim Biol* Ankara. 1940 Vol. 2 No 1 pp. 93-102. [Turkish version pp 85-92.]

¹⁸ PIRINGER (W). Bericht der staatlichen Schutzimpfungsanstalt gegen Wut in Wien für die Zeit vom. I.I.1927 bis 31.XII 1938—*Wsen Klin Woch.* 1940 Feb. 23 Vol. 53 No. 8 pp 151-168.

that of Hogyes, but in May 1938, after the occurrence of two cases of post vaccinal paralysis the method was changed to that of SEARLE. [We note with regret mention of the death of Dr Bruno Bussow a careful worker and philosophic thinker whose thoughtful communications have from time to time been reviewed in this Bulletin.]

The annual report of the Department of Health of Palestine contains a summary by STUART²³ of antirabic treatment during the year 1938. An interesting map shows that treatment is now available at 88 centres scattered from Acre and Safad in Galilee to Gaza and Beersheba in the south, with a central Laboratory at Jerusalem and district laboratories at Haifa and Jaffa. Of 1,376 persons bitten and exposed to risk two developed the disease. "Only one case of neuro-paralytic accident in 1937 has been recorded in the last 6 years, i.e. 1 in 10,600 treatments."

v Rabies in Animals.

GEIGER²⁴ reports a case of rabies in a dog which developed the disease 109 days after it had been bitten.

"Rabies has been eradicated from the British Isles, why not here? This problem is discussed by FLYNN²⁵ of Kansas City in a paper presented to veterinary surgeons in America. He deals with the diagnosis of the disease, both clinical and experimental, the various methods of dog control, and the employment of prophylactic vaccination, and concludes by joint effort, by perseverance by improving our methods and through our elected representatives and officers, we shall succeed and rabies will then cease to be a menace.

An outbreak of rabies in Ontario (Canada) is reported by CAMERON²⁶. Nine dogs, one cat and 3 cattle were affected, and 60 persons received Pasteurian treatment. Methods of control are discussed. A proprietary vaccine (the nature of which is not given) has been tested on monkeys by WEBSTER. McGuire STEPHENS and LAMIRI²⁷ and been found unavailing. The authors recommend a 6 per cent. sheep's brain carbolized vaccine in seven daily subcutaneous doses of 5 cc each.

A large scale experiment on the efficiency of a single injection (5 cc) of a phenol vaccine in protecting dogs from a subsequent intramuscular dose of street virus has been carried out by LEACH and JOHNSON²⁸. Of 105 dogs so vaccinated 24.8 per cent (26 animals)

- ²³ I. LISTINE. DEPARTMENT OF HEALTH. ANNUAL REPORT FOR THE YEAR 1938. HERON (G. W.) Director of Medical Services. Section vii Laboratory Services. STUART (G.) Deputy Director (Labs.) pp 112-115 123-127 & map facing p 104.—Anti-Rabies (Pasteur) Institutes
- ²⁴ PUBLIC HEALTH REPORTS 1940 Aug 23 Vol 85 No 34 pp 1840-1841.—Incubation Period of Rabies in Dogs (Geiger) (J. C.)
- ²⁵ FLYNN (J. C.) The Control of Rabies.—*Canad. Public Health J.* 1940 May Vol 65 No 758 pp 642-648
- ²⁶ CAMERON (A. E.) Rabies Infection.—*Canad. Public Health J.* 1940 Sept Vol 61 No 9 pp 424-427
- ²⁷ WEBSTER (W. J.) McGuire STEPHENS (E. D.) & LAMIRI (B. N.). Prophylactic Anti-Rabies Vaccine for Animals.—*Indian Med Gaz* 1940 June Vol 75 No 6 p 319
- ²⁸ LEACH (Charles N.) & JOHNSON (Harold N.) Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Subcutaneous Injection Method with Phenol treated Vaccine.—*Amer. J. Hyg.* 1940 Sept Vol 32 No 2 Sect B pp 48-53 (13 refs)

died of rabies whereas of 120 untreated controls 55 per cent (66 animals) contracted the disease. As this is a significant result the authors conclude that a single dose of a phenol treated vaccine affords some protection against subsequent experimental exposure to rabies street virus.

vi. Miscellaneous

An omnibus communication dealing with (1) difficulties in the diagnosis of rabies in the dog (2) the question as to whether patients licked on the unbroken skin should or should not receive treatment (3) isolation *versus* destruction of dogs suspected to be rabid and (4) rabies in the mongoose and in the bat is presented by GREVAL and NICHOLAS²³

A G McKendrick

²³ GREVAL (S. D. S.) & NICHOLAS (M. J.) Common Cold Responsible for Grave Suspicion of Rabies in the Dog and a Discussion on Associated Considerations including Rabies in Mongooses and Bats.—*Indian Med Gaz* 1940 July Vol. 75 No 7 pp 401-404 [17 refs.]

VENOMS AND ANTIVENENES

PRÉCIS OF ABSTRACTS IN THIS SECTION

FLECKER (p 166) discusses snake bite in tropical Queensland pointing out that there is much inaccurate information published on the subject and urging closer co-operation between medical men and ambulance attendants

FIDLER *et al* (p 166) have studied the histopathology of monkeys after subcutaneous injections of *Crotalus* venom. The venom is a powerful tissue irritant and some degree of shock is probably produced. TAKAHASHI (p 167) describes the effects of the venom of *Enkydus plumbea* of Formosa. In animals the central nervous system is affected and there is local haemorrhage at the point of injection. There is also action on motor nerve endings and on muscle. The poison glands are small and the venom only weakly toxic the snake is therefore to be classed as intermediate between the poisonous and non poisonous snakes. LE GAC and LEPEUME (p 167) describe the effects of the bite of *Dendraspis jamesoni* commonly known as the mamba. One of the authors was bitten on the ankle and within a few minutes paresis which affected the intercostals developed in spite of a tourniquet. Oedema of the leg appeared later. The patient recovered. PHISALIX (p 167) points out that the injection apparatus of *Dendraspis* is very efficient resembling in this respect that of the *Viperidae*, though the venom is that of the *Colubridae*.

KELLAWAY and TRETHEWIE (p 168) discuss the electrocardiographic changes in the rabbit after intravenous injection of cobra venom and show that adenylyl compounds are liberated from perfused liver kidney and heart of the rabbit after cobra venom injection and after lysocithin.

TABORDA (p 169) draws attention to the necessity for constant conditions in experiments concerned with the clotting of blood by snake venoms and mentions some of the variables encountered.

TAYLOR (p 170) discusses the standardization of cobra antivenene.

CHOWHAN (p 170) discusses cobra and viper venom in the treatment of epilepsy

FOSSER (p. 170) records two fatal cases of bite by a sea snake in each there was haemoglobinuria and swelling of the parotid, and in one there was paresis of the muscles of the head and extremities.

BARROS (p. 171) gives a detailed list of the symptoms of scorpion sting the general symptoms are the result of damage to the hypothalamus, the vasomotor centres and the vagal centres. The sole effective treatment in severe cases is the injection of serum. SARGENT (p. 172) shows that certain popularly held ideas about scorpions in Algeria are untrue. C W

FLECKER (H) Snake Bites in Practice.—*Med Jl. Australia* 1940 July 6. 27th Year Vol 2. No 1 pp. 8-13.

The author gives an account of the study of incidence of snake bite in tropical Queensland, and points out that trivial and unimportant cases form the vast majority of those reported. Very little interest is shown in the identity of the reptiles, and the author hopes this will be remedied in certain instances it is not even certain that a patient admitted to hospital for snake bite has, in fact been bitten.

The author gives details of bite by identified and unidentified, non venomous and venomous snakes, including some which were fatal. The dangerous snakes mentioned are the death adder *Acanthophis antarcticus* the taipan *Oxyuranus scutellatus* and the brown snake *Demonaxia textilis*.

The principal burden of this paper is the need for closer co-operation between medical attendants and ambulance stations, at which the patients are usually first seen, and the realization that the figures given in official returns are misleading Frances G Wilcocks

FIDLER (Herbert K) GLASGOW (Richard D) & CARMICHAEL (Emmett B) Pathological Changes produced by the Subcutaneous Injection of Rattlesnake (*Crotalus*) Venom into *Macaca mulatta* Monkeys.—*Amer Jl Path* 1940 May Vol 16. No. 3 pp 335-364 With 4 figs on 2 plates. [11 refs.]

Accounts of the histopathology of lesions in man caused by the bite of the rattlesnake are rare. The authors gave subcutaneous injections of *Crotalus* venom (1 per cent solution in saline) to 9 *Macaca mulatta* monkeys the doses varying from 7 to 10 mgm per kilo. body weight. Death occurred at an average of 36.6 hours after injection. The principal lesion was marked haemorrhagic oedema at the site of injection, spreading extensively through the adjacent subcutaneous tissues. Necrotic changes in the walls of the small blood vessels were found and in the surrounding exudate were red blood cells with some leucocytes. Ante mortem thrombi were present. The regional lymph glands were swollen and haemorrhagic, with dilated sinuses. There were haemorrhages in the sub-endocardial tissues in the liver and kidneys only slight changes were seen.

The venom is therefore a powerful tissue irritant causing necrosis, and absorption takes place into the lymph stream mainly from the advancing edge of the haemorrhagic lesion. Shock is the most probable cause of death in animals (reported by other workers) which have been given intravenous injections of venom, but the evidence is not so clear for those given subcutaneous injections, although the

subcutaneous loss of blood and fluid was in these experiments sufficiently extensive to be considered capable of producing some degree of shock.

C IV

TAKAHASI (Yosibumi) Morphologische und Pharmakologische Grundlage von *Enhydrys plumbea* (Boie) als eine Art Giftschlange. [Study of *Enhydrys plumbea* as a Poisonous Snake]—*Acta Japonica Med Trop* 1940 Mar Vol 2 No 1 pp 89-103 With 6 figs. [13 refs.]

Enhydrys plumbea is a Formosan snake generally regarded as non poisonous. The author however found poison glands connected with fangs. He describes the naked-eye and microscopic features of the poison apparatus. The bite is not very serious for human beings partly because the amount of venom injected is small partly because the toxic content is in low proportion and partly because the toxicity of the venom is slight compared with that of *Ancistrodon acutus*, *Trimeresurus gramineus* and *T. mucrosquamatus* whose venom that of *E. plumbea* resembles in kind but not in degree. The author was bitten on three occasions on one no ill results followed on the others there was redness and oedema from 1.3 to 2.5 cm in diameter with unpleasant dull aching pain, and on the third occasion suppuration occurred a small abscess 0.8 cm. in diameter forming, which was healed in a fortnight.

The action of the poison was tested on mice rabbits and frogs. Mice were killed with symptoms of central nervous system paralysis and, in particular of the respiratory centre. Injection led to marked subcutaneous haemorrhage and considerable oedema. On excised heart muscle of the frog the action resembles that of digitalis but in large amounts mild paralysis results. On the blood vessels of the frog (hinder limbs) and rabbit (ear) strong vasoconstriction succeeds transient dilatation. In rabbits the effect on respiration is to deepen and amplify the breathing this lasts for some considerable time and only when the dose is large does this effect give place to paralysis and arrest of respiration. Similar stimulant followed by depressant and paralytic effects are produced by the venom on smooth muscle. Studies on nerve muscle preparations of the frog indicate that the poison acts mainly on the motor nerve endings and to a less extent on the muscle itself.

From the smallness of the poison glands the incompletely developed poison fangs and the weak toxicity of the secretion *Enhydrys plumbea* is to be classed as intermediate between the poisonous and non-poisonous snakes.

H H S

LE GAC (P) & LEPESME (P) Sur un cas d'envenimation non mortel par morsure de *Dendraspis* (Colubridé protéroglyphe) [A Case of Non-Fatal Bite by *Dendraspis*.]—*Bull Soc Path Exot* 1940 Apr 10 Vol. 33 No 4 pp 256-258.

PHISALIX (M) Quelques remarques sur la fréquence des effets rapidement mortels des morsures de Colubridés protéroglyphes appartenant au genre africain *Dendraspis* Schleg. [Comments on the Frequency of Rapidly Fatal Bites of *Dendraspis*.]—*Ibid* pp 258-259

1. The bite of *Dendraspis* is usually rapidly fatal and polyvalent serum is regarded as ineffective there has not yet been prepared a

specific serum. The snakes of this genus, commonly known as mambas belong to the Proteroglypha sub-family of the family Colubridae and are akin to the genus *Naja*. Four species are known in Africa — *D. viridis* (W. Africa) *D. jamesoni* (W. and Central Africa) *D. argusiceps* (Central and S. Africa) and *D. arctimoris* (Abyssinia).

One of the authors, Lepesme was bitten on the ankle by a mamba, *D. jamesoni* which he was attempting to capture on a tennis court in the town of Bangui. The snake measured 1.57 metres in length. In spite of a tourniquet applied immediately symptoms of paralysis began to appear in less than one minute and he was taken at once to hospital. Within 30 seconds of the bite there was commencing numbness of the tongue leading to difficulty in speaking. In three or four minutes the limbs were similarly affected and paresis was marked. At the moment of arrival in hospital, seven minutes after the bite, the patient was rigid and almost speechless. There was tachycardia, small rapid pulse, difficulty of respiration, but in spite of this effect on the nervous system the patient was perfectly conscious. An immediate injection of 40 cc. antiserum AO (anti-Bitis and Sepedon) was given together with caffeine, ether and camphor in oil. There was intense general pain and difficulty in breathing owing to paresis of the intercostal muscles. The tourniquet was released after 1½ hours and this was followed by painful bilious vomiting which appeared slightly to relieve the general condition but which persisted throughout the afternoon and night. The following morning the general condition was better but there was intense pain in the limb and oedema up to the knee. This was treated with warm baths. Next day the leg was enormous but in spite of bouts of vomiting the general condition improved after an injection of 20 cc. of antiserum. The subcutaneous injection of a solution of potassium permanganate at the periphery of the wound led to a notable improvement. After this the patient rapidly recovered.

ii. Commenting on the frequency of rapidly fatal effects of the bite of *Dendraspis* Mme. Phisalix asks if the venom is more diffusible than that of other Proteroglypha or if more efficient injection is the cause. She shows that the poison fangs are very fine, long and canalized and that they are rotated far forwards so that the act of biting is like a dagger stroke (*coup de poignard*). At the same moment the venom is injected under pressure deep into the tissues from which it does not escape along the fine tracks left by the fangs. *Dendraspis*, therefore injects the venom of the Colubridae by means of the efficient apparatus of the Viperae. With regard to the properties of the venom itself there is as yet not enough information on which to form definite opinions.

C. IF

HELLAWAY (C. H.) & TRETHEWIE (E. R.) The Liberation of Adenyl Compounds from Perfused Organs by Cobra Venom.—*Australian Jl Experim Biol & Med Sci* 1940 Mar Vol. 18. Pt. 1 pp 63-89. With 10 figs. [13 refs.]

The following are the authors' conclusions —

"The electrocardiographic changes observed in the rabbit after the intravenous injection of cobra venom were bradycardia, increase in the P-R interval, R-S-T deviation and terminal heart block, and in the cat

increase in rate inversion of the T wave extrasystoles increased P R interval (irregularly) appearances resembling branch bundle block and finally ventricular fibrillation.

The injection of cobra venom causes the appearance of adenyl compounds in the outflowing perfusate from the perfused liver of the rabbit this outflow represents only a proportion of the total loss of adenyl compounds from the organ owing to inactivation in the organ itself and in the perfusate by enzymes which are also set free by the venom. The proportion estimated in the perfusate increases when this is collected at 95°C. or when Tyrode containing M/40 NaCN is used as the perfusion fluid. Normal liver perfusate contains neither adenyl compounds in estimable amounts nor the inactivating enzymes. Lacarnol (Bayer) when perfused through the normal liver or when mixed with perfusate from the envenomed organ is inactivated. There is no inactivation when it is mixed with perfusate from a normal organ.

Adenyl compounds and inactivating enzymes are liberated from the perfused envenomed kidney of the rabbit but NaCN M/40 is not very effective in preventing the action of the enzymes.

Adenyl compounds are set free from the perfused heart of the rabbit and of the cat by the injection of cobra venom.

Lysocithin also causes the liberation of adenyl compounds from the perfused liver of the rabbit and the perfused heart of the cat. The outflow reaches a maximum at once whereas that after cobra venom is somewhat delayed. This substance is probably partly responsible for the liberation of adenyl compounds by venom.

"The part played by the local liberation of adenyl compounds in producing the cardiac effects of cobra venom is discussed.

NAKAMURA (Tutomu) Ueber die Wirkung des Gifts von *Naja naja alra* auf das Frochherz [The Action of the Venom of *N. naja alra* on the Heart of the Frog]—*Acta Japonica Med Trop Formosa*. 1940 Mar Vol. 2. No 1 pp 187-190 With 8 figs. [39 refs.]

TABORDA (Armando) Contribuição ao estudo da coagulação do sangue I Falhas nos metodos de coagulação do sangue pelos venenos de cobra [Blood Coagulation I. Pitfalls in Coagulation of Blood by Snake Venom]—*Mems Inst Bulantian* 1939 Vol. 13 pp 431-445 With 2 graphs. English summary

The influencing factors of horse blood coagulation by snake venoms (*Batrachs*) have been studied with control and investigation scope as follows

- a. Variability of clotting time from horse to horse, with a constant venom amount (standard venom) compared with changing amounts of venom in a pre-fixed clotting time
- b. Concentration influence of the same or different anticoagulants
- c. Temperature influence on the test and non influence of time changes on the animal. Constant temperature testing necessity (20°C) and inconveniences of high temperatures exercising a denaturing action on the coagulating principle
- d. Necessity of the use of a standard venom (fresh venom high vacuum dried) which is able to furnish stable solutions and reportable data

According to our experiences, the coagulant unity (U C) has been fixed as the amount of venom required in gammas to clot in exactly 10 minutes at 20°C. 1 cc. of a mixture of 2.5 cc. oxalated horse-blood (determined oxalate concentration) and 0.5 cc of physiological brine solution considering the blood coagulated at the first clot appearance

intramuscular or intravenous injection of 20 to 40 cc. of anti-scorpion serum, repeated hourly until the symptoms abate. In children 80 cc. should be given at the first injection, and especially rigorous treatment is necessary if more than two hours have elapsed since the sting. In benign cases serum is only necessary if pain and adynamia are intense. C IV

SERGEY (Etienne) Sur quelques idées erronées concernant les scorpions de l'Algérie. (False Ideas concerning Algerian Scorpions. — Arch Inst Pasteur d'Algérie 1940 Mar Vol. 18 No 1 pp 38-42)

There are certain widely held misconceptions about scorpions in Algeria. The first is that their venom is more potent in summer than in winter but in careful tests the author has been unable to detect any difference. The second is that black scorpions are the most dangerous. *Pseudoscorpion* is black and is rare in Algeria, but its venom has been shown to be less toxic than that of the lighter *P. australis* and furthermore the amount of venom in the telson of *P. australis* is less than that in *P. australis*. The third is that if a scorpion is surrounded by a ring of fire it stings itself to death. This is not true. The scorpion strikes its sting against the cephalothorax, but the sting does not penetrate. It is killed in attempting to pass through the flames. The fourth is that scorpions are carried by the wind, in stormy weather to the upper floors of buildings. This again is untrue, the scorpions are more active in the windy season and are found high up in buildings because they have climbed the walls. C IV

MALARIA

PRICES OF ABSTRACTS IN THIS SECTION

FAUST and PARKER (p. 173) discuss malaria mortality in the southern United States, which in 1933 was the lowest on record. An early rise in the rate is expected in accordance with previous cycles, unless there is effective control.

BARBAS (p. 174) reports that the importation of labour into Lahuy Island, which was reputed to be free from malaria, was followed by an outbreak in which adults suffered more than children. *A. flavirostris* and *A. maculatus* breed in the island.

MOSE (p. 174) reviews the subject of malaria in drug addicts in New York. The majority of the infections are due to *P. falciparum* and cerebral symptoms are common. Gastro-intestinal symptoms and blackwater fever have also been observed. Infection is acquired from the use of hypodermic syringes, which are not sterilized, for the intravenous injection of the drug. MOSE and JOLLIFFE (p. 175) give in detail the treatment they employ in these cases.

SHUTE (p. 176) found that *A. maculipennis* var. *atroparvus* from English sources could not be infected with Indian or African strains of *P. falciparum* though infection with *P. mex* and *P. ovalis* is easily

accomplished GARNHAM (p 176) states that in Kisumu *A. funestus* shows greater predilection for human habitations as compared with cattle sheds than does *A. gambiae*. He discusses the habits of *A. funestus* in relation to malaria and distinguishes three varieties of the type form according to the amount of pigment found on the tergal plates of the 5th abdominal segments of the larvae. Since most *A. hyrcanus* var *sinensis* caught in a house in Shanghai over a long period were found in bedrooms HU (p 176) suggests that screening of the windows of the bedrooms would be a cheap and effective antimalaria measure.

DANIEL (p 177) records a number of cases in which malaria simulated acute abdominal conditions and points out that leucopenia is a suggestive point in diagnosis.

FORBES (p 177) discusses the action of quinine in causing nerve deafness and points out that quinine given to a woman during pregnancy may cause deafness and amblyopia in the child. Quinine has a predilection for the auditory nerve. COLE *et al* (p 178) point out that alarming symptoms may be met in the course of therapeutic malaria and may necessitate the termination of this form of treatment. They have therefore attempted to find a drug which will control these symptoms without eliminating the malaria and report that sodium bismuth thioglycollate (thio-bismol) fulfills these conditions. In *P. vivax* infections one intramuscular injection of 0.2 gm. gives a 48-hour respite from fever or will transform a quotidian to a tertian fever. Repeated injections can arrest clinical malaria for long periods. The drug is not a substitute for quinine.

WATSON (p 178) refers to the great progress which has been made in malaria control in India. VEYRE (p 179) considers that neglect of control measures has led to increase in malaria in part of Tonking.

LAMPRELL (p 179) shows that on a tea estate in Assam the administration of quinine or atebrom in the absence of larval control produced results in the prevention of malaria which were better than might have been expected. After the cessation of administration however the incidence of malaria in the treated persons was much higher than in controls.

DZHANGIROV (p 179) reports that an infusion of tobacco dust in water is a most effective spray against adult mosquitoes especially if 0.5 per cent. soft soap is added. The mixture remains in good condition for only 10 hours.

MORGAN (p 180) states that paddocks planted with the grass *Melinis minutiflora* will not harbour mosquitoes but unfortunately this grass will not grow on swampy ground. C IV

FAUST (Ernest Carroll) & PARKER (Virginia) **Malaria Mortality in the Southern United States for the Year 1938—*Southern Med J* 1940 Aug Vol. 33 No 8. pp 897-900 With 2 figs.**

Malaria mortality for 1938 in the Southern United States as a whole was the lowest on record. The average rate per 100 000 was 5.8 as compared with 6.9 for 1937, 6.6 for 1931, the lowest annual rate of the previous cycle, 11.9 for 1929 and 11.4 for 1933, the highest annual rates. The most marked decline was in Georgia from 7.6 in 1937 to 4.6. It would appear that the low point in the five-to-seven year cycle was reached in 1938 and that barring effective control an early rise in the mortality curve may be anticipated. An interesting

SHUTE (P. G.) Failure to Infect English Specimens of *Anopheles maculipennis* var *atroparvus* with Certain Strains of *Plasmodium falciparum* of Tropical Origin.—*Jl. Trop. Med. & Hyg.* 1940 Jul 1 Vol 43 No 13 pp. 175-178 [10 refs.]

A. maculipennis var *atroparvus* from English sources can be readily infected with *P. vivax* and with *P. ovale*. It has also been used for the successful transmission of Italian and Rumanian strains of *P. falciparum*. The author describes his attempts at infecting this English anopheline with one Indian and three tropical African strains of *P. falciparum* without success. The failure cannot be ascribed to insufficiency or immaturity of gametocytes nor yet to temperature. The conclusion is justified that persons carrying gametocytes of *P. falciparum* of tropical origin would be very unlikely to transmit infection in this country through the agency of English *A. maculipennis*. [See also this Bulletin 1919 Vol. 14 p. 83 1920 Vol. 15 pp. 108 399 Vol. 16 p. 308.]

N IV

GARNHAM (P. C. C.) Epidemiology of *Anopheles funestus* Malaria with Special Reference to Tergal Plate Varieties and Maxillary Index.—Reprinted from *Commentus Tertius de Tropiciis Alique Malariae Morbis II* Amsterdam 1938 pp. 161-177 With 9 figs.

A. funestus is second only to *A. gambiae* in importance as a vector of malaria in tropical Africa. In Kisumu Kenya there are anomalies in the transmission of the disease by this species to which the author calls attention. The density of *A. funestus* rises to a maximum at a time when malaria incidence is declining. The type form of *A. funestus* in Kisumu has a seasonal prevalence much less connected with rainfall than has *A. gambiae*; the maximum prevalence occurs some three months after the season of maximum rainfall and there is a fair production of the species throughout the year. The type form has a much greater predilection for human habitations as compared with cattle sheds than has *A. gambiae*. The sporozoite infection rate is higher in the dry season than during the rains; in the dry season malaria is on the wane. In Kisumu there is a large amount of quartan malaria, particularly in young children. It is mild and the patients rarely come for treatment. Malaria cases treated are almost all subtertian. *A. funestus* is a very efficient transmitter of *P. malariae*.

Three varieties of the type form of *A. funestus* have been distinguished, according to the amount of pigment in the tergal plate 8th abdominal segment of the larva. Light intermediate and dark plate varieties occur. The first variety is the commonest; the other two are found during the rains. All three carry malaria. The maxillary index was constant round about 11. There was no significant difference between the maxillary indices of wild infected and uninfected mosquitoes.

N IV

HU (Stephen M. H.) The House-frequenting Behavior of *Anopheles hyrcanus* var *sincensis* Wiedemann in the Shanghai Area, Part 3. Indoor Resting Places.—*Langmuir Sci. Jl.* 1940 Vol. 19 No. 3 pp. 403-410 With 1 text fig. & 3 figs. on 2 plates.

In a farmhouse near Shanghai consisting of store room, living room, kitchen and bedroom search was made for anophelines once a fortnight

from April to November. The collections were made in the mornings. Of the total number of 262 *A. hyrcanus* var *saxensis* taken 81.2 per cent were found in the bedroom. Bedrooms in such farmhouses usually contain but one small window each. Screening these windows would be a cheap and probably effective antimalaria measure.

N W

DANIEL (Rollin A) *Malaria simulating Acute Surgical Diseases of the Abdomen.*—*Ann Surgery* 1940 Mar Vol. 111 No 3 pp 436-445

The author describes nine cases of malaria which on admission to hospital displayed symptoms strongly suggestive of acute abdominal disease calling for surgical intervention. Eight of these cases occurred among a total of 266 patients admitted during 13 years to the Vanderbilt University Hospital in whom a diagnosis of malaria was made regardless of the conditions for which the patients were admitted to hospital. One patient was a child of 15 eight were adults. Seven had *P. vivax* infections an unusually high proportion in cases of this kind. The other two patients were infected with *P. falciparum*. Six patients were admitted as emergencies to the surgical service. In six patients there was a sudden onset of severe abdominal pain in the other three the pain was mild at first but gradually increased in severity. In most of the cases high fever was not a prominent symptom. The spleen was enlarged in only one patient and in this case marked abdominal tenderness and muscle spasm rendered the spleen non palpable. In three there was definite involuntary rigidity of the abdominal wall. In establishing a diagnosis the existence of leucopenia was suggestive in eight cases. The finding of malaria parasites in the blood does not of course preclude the possibility of the co-existence of intraperitoneal disease in illustration of this the author cites another case in which tertian malaria complicated a localized peritonitis arising from a perforated duodenal ulcer. All the nine patients of the series recovered in response to malaria therapy.

N W

FORBES (S B) *The Etiology of Nerve Deafness with Particular Reference to Quinine.*—*Southern Med J* 1940 June Vol. 33 No 6 pp 613-620 With 13 figs [16 refs.]

The author passes in review published work regarding the action of quinine in causing deafness. He describes four cases of so-called congenital deafness. In all of these cases the mother had taken considerable quantities of quinine during pregnancy. A large number of cases of all types of deafness from the author's records are reviewed. In 92 of 234 cases of nerve deafness there was a definite history of the ingestion of quinine over a considerable period of time. eighteen of these patients thought that quinine had caused their deafness. Of 832 cases of deafness other than nerve deafness only 82 had taken quinine and none of them associated the taking of quinine with their deafness. It is well established that quinine has a predilection for the auditory nerve. There is experimental and clinical evidence that quinine administered to the mother during pregnancy may cause

deafness and amblyopia, in the child. A number of audiograms are shown illustrating the suggestive rôle of quinine in the causation of nerve deafness.

Λ II

COLE (Harold V.) DEOREO (Gerard A.) DRIVER (James R.) JOHNSON (Herbert H.) & SCHWARTZ (Walter F.) Use of Bismuth Injections to manage Course of Therapeutic Malaria.—*Jl. Amer Med Assoc* 1940 Aug 10 Vol 115 No 6. pp. 422-428. With 3 charts 20 refs.]

Therapeutic malaria in the treatment of syphilis of the central nervous system may produce alarming symptoms such as prolonged remittent fever physical exhaustion, vascular collapse [presumably syncope persistent vomiting, increasing anaemia, rapidly rising icteric index or rapidly rising blood urea nitrogen. If some agent could be found which would cause a temporary interruption of the fever sufficient to permit of recovery from such symptoms, the course of malaria therapy might be completed, when otherwise it might have to be abandoned. To this end the authors have experimented with preparations of various heavy metals. They find that thio-bismol answers the requirements. Thio-bismol is sodium bismuth thioglycollate $\text{Bi}(\text{SCH}_2\text{CO}_2\text{Na})_3$ and contains 33 per cent. of bismuth. The average 0.20 gm. intramuscular dose contains 75 mgm. of metallic bismuth. The bismuth content of the blood reaches a very high level within a few hours of the injection and then as rapidly drops. The action of the drug appears to be a bismuth effect on the malaria parasite sodium thioglycollate alone has no effect on the malaria. The results of the use of thio-bismol in the treatment of 103 patients undergoing malaria therapy are recorded. *P. ferox* is the species used for malaria therapy and infection is procured by blood inoculation. In prolonged remittent fever a single injection of thio-bismol generally procures a forty-eight hour respite from fever after which paroxysms return on alternate days. A single injection will transform a quotidian (double tertian) into a tertian fever. Repeated injections can arrest clinical therapeutic malaria for long periods. In 92 cases there were but four in which a single injection of the drug produced no effect on the malaria. Thio-bismol is not a substitute for quinine in terminating malaria, but by its use many untoward therapeutic malaria results may be avoided.

Λ II

WARREN (Malcolm) Prevention of Malaria in India. Recent Advances.—*Nature* 1940. June 8. Vol. 145 No. 3634 pp. 878-881 With 1 fig.

The author has recently made a tour in India visiting Delhi and Hyderabad, and estates in Southern India, Assam and Bengal. He contrasts the work now being done in the control of malaria with the state of affairs eleven years ago when he made a similar tour in India. He reports astonishing progress. He expresses the opinion "that the work in India is the greatest achievement in the control of malaria in the past decade that the best of it and there is much best, is worthy of comparison with the best work done at Panama or with Mousolini's great achievement in the Pontine Marshes and in area it is vastly greater than either."

Λ II

VEYRE Recherches sur le paludisme à Cao-Bang et sur l'évolution de l'endémie pendant la dernière décade [*Malaria in Cao-Bang and the Evolution of Endemic Malaria there during the Last Decade*].—*Rev Méd Française d'Extrême-Orient* 1940 Jan. No 1 pp 8-22. With 4 charts & 2 maps.

Cao-Bang is on a peninsula formed by the confluence of the Sông Hiem with the Sông Bang-Giang in the north of Tonking. It has a reputation of being a healthy station but the author shows that there is a considerable amount of endemic malaria which has recently shown a tendency to increase. The increased prevalence is attributed to recent neglect of measures of control which gave good results in 1933-1935. The observations recorded are of local interest.

N IV

LAMPRELL (B. A.) Quinine and Atebrin in the Control of Malaria, with Special Emphasis on the Practical and Economic Viewpoints. —*Indian Med Gaz* 1940 May Vol 75 No 5 pp 266-274. With 7 figs.

On a tea estate in the Sibsagar District of Assam malaria is hyperendemic. *A. minimus* is the principal vector. Within the half mile radius of the main lines in which there is a population of 2 173 persons there are ten miles of water-courses in which the vector breeds. An annual expenditure of Rs. 1 400 on larvicides and sprayers did not effect much improvement. In 1938 antilarval measures were suspended and an experiment was made to control the incidence of malaria by the issue of prophylactic drugs limiting the expenditure to the sum of Rs. 1 400 previously spent on destroying larvae. Considering the inadequacy of the expenditure the results appear to have been better than might have been expected. One group received a five-day course of atebrin and thereafter each adult was given 0.2 gm of atebrin one day a week from the end of May till mid-September. Members of a second group received quinine on five consecutive days every third week. A third group acted as a control. There was a diminished prevalence of the disease in both atebrin and quinine groups during the period of drug administration but the incidence of malaria in the weeks following the cessation of drug administration was much higher than in the control group more especially in the group that had received atebrin. The diagnoses were clinical; no blood examinations were made.

N IV

DZHANGIROV (K. G.) Utilisation de l'infusion du tabac dans la lutte contre le moustique. [*Tobacco Infusion as a Spray against Mosquitoes*].—*Med Parasit & Parasitic Dis* Moscow 1939 Vol. 8, No 5 pp 93-94. [In Russian.] [Summarized in *Rev Applied Entom* Ser B 1940 Oct. Vol. 28 Pt 10 p 186.]

Tobacco dust is often used for fumigating against adult mosquitos in day time shelters and hibernation quarters in the tobacco-growing district of Slavyansk in northern Caucasus but the fumigation is unsatisfactory in many of the buildings owing to cracks in walls and other defects. Experiments on the possibility of using the tobacco as a spray against mosquitos in cellars were therefore carried out in

December 1938. The spray was prepared by allowing 5 lb. tobacco dust to steep in 1 gal. cold water for 1-2 days and then straining the infusion, which contained about 0.1 per cent. nicotine. Examination of the cellars 24 hours after spraying showed that 88.7-97 per cent. of the mosquitos were killed when the infusion was used alone and 100 per cent. when 0.5 per cent. soft soap was added to it just before it was applied. The mixture did not remain in good condition for more than ten hours.

MORGAN (Edward) The Tropical Grass "*Melinis Minutiflora*" as a Preventative against Malaria and Other Tropical Diseases.—*Jl Trop Med & Hyg* 1940 July 1 Vol 43 No. 13, p. 179

Melinis minutiflora also known as Gordura or Capim Melado is a coarse grass that has done much in Venezuela to control pests. If paddocks be planted with this grass mosquitoes, snakes, etc. become almost non-existent when the grass is green. To quote the author —

cattle covered with ticks when entering such planted areas would, after a few weeks' stay be free of these parasites (provided they were kept entirely on this grass in its green stage). Apart from its anti-tick effects, it is a grass rich in protein and is thus extensively planted both in Venezuela and Colombia for fattening animals. It has a peculiar penetrating and pleasant odour. When walking through the damp pasture one's boots appear as having been greased due to the kind of oily substance it contains. This probably is the principle secret of its anti-verminous effects.

Unfortunately the grass will not grow on swampy ground. A. H.

MISCELLANEOUS.

CULWICK (A. T.) & CULWICK (G. M.) A Study of Population in Ulanga, Tanganyika Territory — Reprinted from *Sociological Review* 1938. Oct. Vol. 30 No. 4 and 1939 Jan. Vol. 31 No. 1 34 pp. With 2 figs.

After showing the inadequacy of available vital statistics in the Ulanga district the authors explain their method of random sampling, by which information was obtained from over 2,300 women of all ages. It is pointed out that the authors, having lived and worked in the district for 4 years, were well known to the natives and that they consider the information collected to be reliable enough to allow conclusions to be drawn. Cross-enquiries were made from time to time, with satisfactory results. By questioning the women, information was obtained as to marriage, number of children born and number of children dead. Rough estimations of age in the latter category were made and the ages of the women themselves at the time of questioning were also estimated in broad age groups.

In 6 areas it was observed that the fertility rates could be divided into two groups which differed significantly from each other not only in total fertility but also in age distribution — that is, not only was the one group less fertile but the fertility of the older women in that group was less than that of the younger in that the older women

showed an unduly high proportion of sterility after the birth of the first child. This dates back in many instances to the great Maji-Maji Rebellion of 1905-6 and the famine which followed it and the areas thus affected in fertility were those involved in the rising and which suffered destruction of their crops and confiscation by the Germans of their food reserves. The areas of higher fertility were those which remained loyal to the Germans. The famine not only caused extremely high casualties but appears to have reduced the average fertility of the surviving women by over 25 per cent. but there has been a considerable increase in fertility during the last 15 years.

The influence of polygamy was next considered and the authors point out that polygamy is not and cannot be common concluding from their enquiries that the polygamy which exists has no effect upon the birth rate.

Infant mortality in the accepted sense was impossible to assess but the authors' work leads them to the conclusion that roughly 25 per cent. of the children born are lost during the first 6 months of life and about 13 per cent. more die between 6 months and the age of weaning bringing the total wastage of child life before weaning to 38 per cent. In comparing this rate in the different age-grades of the mothers it appears that there is no sign of improvement in the position during the 30-year period covered by the investigation for the young mothers of 20-30 show a rate of 376 per 1 000 live births as against 384 and 370 for their elders. It is pointed out that the rate in first children is 423 in subsequent children 354. There is however some evidence to suggest a decline in infant mortality in very recent years. It is further shown that 53 per cent. of children died in the years between birth and puberty and since by tribal custom the ceremonies associated with the attainment of puberty are distinctive and since mothers have shown no hesitation in recalling whether or not the dead child had passed this important point the authors regard this figure as the most reliable of all.

In discussing the distribution of surviving children the authors show that the ratio of children to adults is only 40 per cent. The distribution in the different age grades of childhood is such that it is concluded that there has been a sudden drop in fertility in very recent times. This may be due to the campaign, started in 1935 to persuade mothers not to feed infants on solid food. The campaign has had considerable success and has probably led to a diminution in mortality and therefore to a prolongation of the suckling period during which the taboos of native custom prevent conception.

With regard to the balance of births and deaths it is shown that the net reproduction rate is only 0.73 in the old women and that on this basis the population may be expected to decrease at the alarming rate of 27 per cent. for each generation, unless conditions change. Similar figures are found in considering somewhat younger women but in those aged 20-30 the decline appears to be less and it is thought that at last fertility is increasing. The causes of infant mortality need urgent investigation and there are indications that syphilis may be an important feature.

[This valuable paper and its implications deserve close study. It is evident that the work could not have been carried out without great care and thought and without gaining the confidence of the natives.]

NAPIER (L. EVERARD) & DAS GUPTA (C. R.) Haematological Studies in Indians. Part XII. Haemoglobin Standards in Children and Adolescents.—*Indian J Med Res* 1940 July Vol. 28. No. 1 pp. 207-224. With 9 figs.

Three series of Indian boys and girls in Calcutta, aged from 4 to 20 years, were investigated. The haemoglobin was estimated by the Heflige method, and the heights and weights of the children taken. The first series comprised 208 Indian Christian and Bengah Hindoo girls from middle class families. In the second series were 553 Hindoo boys of middle class and in the third series were boys of the Punjab Sikh artisan class. The data are set out graphically and in tables, and in the latter correlations between Hb and height and weight are given as plus or minus [no degree of correlation is calculated]. The authors say that on the grounds of being above or below the average weight for their age it is possible to divide Bengah boys into two groups in which the Hb curves are significantly different from one another the better nourished boys having distinctly higher haemoglobin [statistics are not given]. The curve rises from 11.5 gm. Hb per 100 cc. blood at 5 years to about 13.5 at 16 years. They conclude that the Hb. level of the adult, about 15 gm. is not reached until about the 25th year. The female curve departs from the male curve about the 11th year and subsequently rises more slowly to the adult level of 12.5 gm. There seemed to be little difference between the Hb curves of the two groups of boys investigated. The weight curves run parallel up to the 14th year after which Sikh boys are heavier. The Bengah boys are slightly taller up to 14 years, after which the height curves cross [the statistics of significance are again not given and as the groups are of different aires visual inspection of the curves may be to some extent, misleading]. W P Kenned

HAKE (H. P.) Clinical Investigations into Anaemia in Assam. Parts I-VII.—*Indian J Med Res* 1940. Apr Vol. 27 No. 4 pp. 1041-1069 With 1 map. [10 refs.]

Severe anaemia is common among tea estate coolies in Assam, though European residents have normal blood pictures. The haemoglobin level in the coolies is low compared with that of city dwelling Indians, and the severe microcytic hypochromic anaemia seems to be an exacerbation of this partial anaemia. The only constant correlation found was that between low Hb. and the standard of living. Tea estate coolies are recruited from rural India and on arrival in Assam they showed a normal erythrocyte count, with Hb deficient by about 25 per cent. and reduced cell volume.

The incidence of anaemia shows no seasonal variation. It increases in proportion to the length of the working day though the reason for this is obscure. A group of 20 cases of masked anaemia in non pregnant women showed microcytic and hypochromic anaemia but two were examples of a definite clinical entity the author has called micro-macrocytic anaemia. The average incidence of anaemia complicating pregnancy was 24.3 per cent. of all deliveries after the 28th week, but it varied greatly on different estates, and was highest among women delivered in the third quarter of the year. It is the most important cause of maternal mortality in this class, and increases the risk of premature still-birth.

The author advances the theory that the common anaemia in coolies apart from pregnancy is due to a more widespread cause than

either malaria or ankylostomiasis and this is probably a long-standing dietary defect. In pregnancy a new feature appears for a large proportion tend towards the macrocytic hypochromic type and it is suggested that these cases are due to concurrent dietetic deficiency the presence of the foetus and chronic malaria acting on an already inefficient haemopoietic system [The detailed discussions in this painstaking paper cannot be readily summarized.] *W P Kennedy*

NAPIER (L. Everard) *Anaemia in Pregnancy in India the Present Position.*—*Indian Jl Med Res* 1940 Apr Vol. 27 No 4 pp 1009-1040 [62 refs.]

Anaemia is a major cause of the high maternal mortality in India. The incidence is greatest in the second half of the year. Oedema occurs in nearly all cases fever in more than half albuminuria and diarrhoea in 25 to 50 per cent and most reports mention relatively frequent splenic enlargement while some note more Wassermann plus cases than in the general population. The healthy city dwelling Indian living on a good mixed diet has a blood picture similar to that of Europeans in the West but rural and poorer Indians have much lower haemoglobin levels and often other evidences of dyshaemia while a large number are clinically anaemic. The aetiological factors responsible for this dyshaemia are wide spread in the particular populations. Three common types of anaemia are —(a) A microcytic hypochromic iron deficiency anaemia associated with low iron intake and ankylostomiasis. (b) A macrocytic hyperchromic anaemia due to dietary lack of a factor present in autolysed yeast and in crude liver extracts and which is not pernicious anaemia. (c) A second type of macrocytic hyperchromic anaemia distinguished from (b) by hyperbilirubinaemia (a positive van den Berg) a high reticulocyte count and usually splenomegaly. It is probably associated with chronic malaria and a deficient diet.

In the later months of pregnancy an anaemia (physiological or due to relative dietary deficiency) is generally recognized in other countries. It shows an increased mean corpuscular volume. Pregnancy anaemia incidence in India is correlated with anaemia in the general population but is higher. Pregnancy anaemia is more macrocytic though in some places this is masked by the microcytosis of iron deficiency. It is amenable to treatment in early pregnancy but later it is only possible to arrest the blood deterioration till after labour when an immediate improvement occurs.

The present hypothesis is that pregnancy anaemia is due to the several factors responsible for anaemia in the general population and to another factor associated with the presence of the foetus. Among the common factors known are ankylostomiasis specific and general dietary deficiencies and chronic malaria. The foetus makes extra demands on essential food substance and Napier adduces some evidence that a toxæmia associated with the presence of the foetus also plays a part.

W P Kennedy

HARE (K. P.) *The Mode of Origin and Progress of Anaemia in Pregnant Tea Garden Coolies.*—*Indian Med Gaz* 1940 May Vol. 75 No 5 pp 274-278

Thirty-one women anaemic at all stages of pregnancy and 128 found to be anaemic after the 28th week were investigated. Four

groups were found —(A) microcytic-hypochromic, comprising roughly half the cases (B) normocytic hypo-orthochromic, about one-tenth (C) micro-macrocytic hypo-orthochromic, about three-tenths, and relatively dangerous (D) macrocytic-hyperchromic, about one-tenth of the cases and very dangerous. The heaviest incidence of onset was in the third quarter of the year.

Monthly examinations of the patients produced evidence supporting the claim that cyclical changes in the blood picture occur in untreated anaemias and also NAYLOR's belief that microcytic anaemia may alter in type. Hare suggests the primary cause of these anaemias is relatively excessive foetal demand for haemopoietic substances where the maternal intake is minimal. Absolute iron deficiency causes the severe cases of group A and relative deficiency the remainder. Absolute deficiency of the extrinsic factor associated with vitamin B causes group D and relative lack, group B. Group C is due to a relative deficiency of both iron and the extrinsic factor. This theory of causation also accounts for seasonal variation. W. P. Kennedy

TAYLOR (Geoffrey F.) & MANCHANDA (S. S.) Report on Twenty Four Cases of Tropical Macrocytic Anaemia in Punjabi Men.—*Indian Med Gaz.* 1940. June Vol. 75 No. 6. pp. 321-324

Macrocytic anaemia is fairly common in the Punjab. The cause is mainly dietary deficiency. In addition 20 of the series had ankylostomiasis 12 malarial splenomegaly 12 diarrhoea, and 2 syphilis. Sternal puncture of 19 patients showed increased normoblasts in 11 and increased megaloblasts in 8. One patient died and a description of the autopsy is given. Therapy with marmite and yeast orally and liver parenterally produced rapid improvement in 11 slow recovery in 7. 5 left before completion of treatment. The blood and sternal puncture picture appeared the same as in pernicious anaemia except that haemoglobinized megaloblasts were absent from the sternal puncture material. W. P. Kennedy

O'CONNOR (K. J.) A Short Clinical Note on "Foot Rot."—*Jl Roy Soc Med Sci* 1940 Apr Vol. 26 No. 2 pp. 171-172.

Many treatments have been tried and many more suggested for a troublesome condition of the tropics and sub-tropics, known as "Foot rot," "Hongkong foot" and by other names [see this *Bulletin* 1931 Vol. 28 p. 386 1932 Vol. 29 p. 272 1935 Vol. 32, p. 185]. The author has found the following very successful —

"The régime now established is as follows: (a) Wash the feet twice a day in soap and water and dry carefully. (b) apply surgical spirit. (c) paint on Fungolme "B" and allow to dry. (d) apply 5 per cent. boric acid liberally. (e) white socks to be worn, and changed daily as mentioned above the socks to be soaked in disinfectant, and boiled. (f) after the acute stage has gone which should take place in from three to twelve days, the powder is to be persisted with for at least four weeks."

Unfortunately the formula of Fungolme B is not stated, but the preparation is obtainable from Messrs. Elmhurst Ltd., Great Marlborough Street London, W. 1

The author had previously tried all the usual treatments by gentian violet, mycostol, salicylic acid, eucal, etc. Under the form of treatment detailed above the condition has cleared up completely and so far has not relapsed. H. H. S.

DE MEILLON (B). [Report of the Department of] Entomology—*Rep S African Inst Med Res Johannesburg 1939* pp 30-37
[Summarized in *Rev Applied Entom Ser B 1940 Nov*
Vol. 28 Pt 11 pp 211-212.]

Some of the information in this report has been noticed from other sources. *Anopheles gambiae* Giles, *A. funestus* Giles and *Aedes aegypti* L. were included in a collection of mosquitos received from Angola. In connection with the finding of *Anopheles gambiae* on the Witwatersrand early in 1939 it is pointed out that in spite of the most thorough search, even in areas where every small pool was teeming with larvae only 4 adults were found in dwellings. At the same time 27 females were taken in dairy stables in the northern suburbs and 11 out of 14 of them subjected to the precipitin test were positive for bovine blood whereas none contained human blood. 8 of these females were dissected and found to be free from malaria parasites. These findings are contrary to the usual observations in an area where *A. gambiae* occurs and it is suggested that when breeding under unusual climatic conditions, it may change its habit and become zoophilous. With the first cold weather the species disappeared—it could not be found in May and June and up to January 1940 it had not reappeared. It seems unlikely that it will do so until the exceptionally widespread breeding that took place over the Transvaal in 1937-38 is repeated.

Investigation of an outbreak of disease among farm labourers in the Transvaal resulted in the finding of numbers of the tick *Ornithodoros moribata* Murr. in the compound where the men were lying ill and blood slides subsequently taken revealed the presence of spirochaetes. This is the first record of an outbreak of relapsing fever on the Transvaal highveldt.

A flea survey of the Union is in progress and an analysis of the records shows that wild fleas have been taken on domestic rodents and domestic fleas on wild rodents moreover some wild fleas were taken on a patient suffering from plague so that the suspicion that they may transmit plague to man is confirmed beyond reasonable doubt. *Protophysa muris* in its adult stage an intestinal parasite of rodents was recorded from *Xenopsylla eridos* Roths. from the Orange Free State hitherto this Nematode has been recorded from *X. cheopis* Roths. It is probable that the flea becomes infected in the larval stage when feeding on nest debris contaminated with rodent faeces rodents would then acquire infection by eating infected fleas. Larvae of *Hymenolepis nana* were found in *X. hirsuta* Ing. and *X. brasiliensis* Baker. Examples of *X. cheopis* fed on a guinea pig infected with human louse-borne typhus failed to transmit the disease when subsequently fed on a guinea pig or a rat. In an experiment in which batches of 50 very young larvae of *X. brasiliensis* were placed in sand provided with food and reared at about 76.5°F and relative humidities of about 33, 51, 65 and 73 per cent. the numbers of adults obtained were 0, 41, 44 and 43 respectively. The ability of this flea to complete its life-cycle at a relative humidity as low as 51 per cent explains the fact that it commonly breeds in the debris on the floors of sheds, garages and huts in which the humidity is much lower than in the nests of burrowing field rodents. A single experiment to determine whether the larvae could migrate to the moister depths if the surface of the soil was dried off showed that all died in the dry surface.

Beetles received from Bechuanaland, where they have been observed to cause painful blisters, have been identified as *Epicauta bispinosa* Muls. A further case of intestinal infestation with Coprids of the genus *Onthophagus* was reported during the year the beetles had been passed by a native child."

SINTON (J. A.) & SMITH (P. G.) Memorandum on Measures for the Control of Mosquito Nuisances in Great Britain.—Ministry of Health. Memo 236 Med 29 pp With 2 plates. 1940 London H.M.S.O. [6d]

HAMILTON (D. G.) Tick Paralysis a Dangerous Disease in Children.—*Med J Australia* 1940 June 1 27th Year Vol. 1 No 22 pp 759-763 With 5 figs [12 refs.]

This is a very full account of tick paralysis in Australia, with notes of 7 cases, all in children. It is well known that tick paralysis is a dangerous disease in dogs, but it is not sufficiently realized that it can affect man and may be fatal in children. The ticks incriminated are *Ixodes holocyclus* in Australia, *Dermacentor andersoni* (and also *D. variabilis* see this Bulletin 1939 Vol. 36, p 577) in America, *Ixodes fuscus* in Africa and *I. ricinus* in Europe. Various domestic animals are susceptible, but all native fauna are probably immune. The disease consists of a widespread lower motor neurone paralysis which commences after the tick has been feeding for some days. The height of the weakness is reached about 48 hours after the tick drops off or is removed, but if this period of maximum paralysis is passed, recovery sets in and no residual paralysis is left. The paralysis may be purely local and a bite on the face or in the ear may cause nothing but facial paralysis.

Ixodes holocyclus is the sole tick to be incriminated in Australia and it occurs only in a narrow belt a few miles wide along the east coast of New South Wales and Queensland and in a similar belt in Western Australia. The tick needs ample rainfall and a warm temperature and depends on the presence of bandicoots which are the hosts of both immature and mature forms. Only the mature female causes paralysis but many mature females are non-toxic. There is good evidence that the venom is produced in the salivary gland.

In treatment removal at the earliest moment is essential, but when the tick is engorged it may be dangerous to grasp it with forceps, since this may squeeze toxin from the enlarged glands into the patient and may increase the paralysis. It is wise therefore to excise a small piece of skin to which the hypostome is attached, without squeezing the tick and after it has been killed with ether. Emphasis is laid on careful search for ticks in cases of paralysis. An antiserum has been prepared and is useful in doses of 10 to 20 cc. intramuscularly repeated if necessary. Other treatment is symptomatic.

Motor function alone is paralysed, and this suggests that the lesion is in the cord. Whether spread of the toxin is by the blood or along the nerves has not been determined, but the author refers to the spread of tetanus toxin and of neurotropic viruses along the nerves and suggests that the same route may be taken by tick toxin.

The symptoms are set out in detail and notes are given of 7 cases of which 2 were fatal. [See also this Bulletin 1939 Vol. 36, pp. 575-578.]

C. II

TROPICAL DISEASES BULLETIN.

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[No 4

SUMMARY OF RECENT ABSTRACTS

III MALARIA

[continued from p 144]

Treatment

G (p 791) argues against the short term treatment of malaria, stating that the aim of the physician should be to eliminate the parasite. He maintains that there is no adequate evidence that short term treatment results in efficient premunition or in immunity and that it is dangerous in that it does not prevent the pernicious symptom of subtertian malaria. It also favours the development of carriers [These views may be set against those of SINTON referred to under Immunity in the preceding Summary of Recent Abstracts (this Bulletin 1941 Vol. 38 p 141)]

SANDERS and DAWSON (p 185) found that after treatment consisting of 20 grains of quinine daily for 5 days relapses of malaria occurred in 25 to 45 per cent. of patients. These relapses were rather more frequent in *P. falciparum* than in *P. vivax* infections. The fever however was suppressed as rapidly as with larger initial doses.

NIVEN (p 131) found no difference in efficiency between totaquin and quinine in benign tertian malaria neither is an efficient gametocide. The optimum dose of totaquina for adults is 2 gm. each day. WIJERAMA (p 668) has compared totaquina with quinine bisulphat in the treatment of malaria, and has found the former to be the more effective.

SIEGENBEEK VAN HEUKELOM (p 745) discusses the haemoglobin changes after treatment of subtertian malaria with atabrin or quinine or both. Low blood haemoglobin figures tend to rise and high figures (which may be due to blood concentration) to fall.

COPPOLA (p 601) considers that variations in the bilirubin content of the blood are more likely to be caused by malaria than by any possible haemolytic action of quinine. He states that there is no evidence that quinine influences the normal process of haemolysis.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Disease Bulletin* 1940 Vol. 37. References to the abstracts are given under the name of the authors quoted, and the pages on which the abstracts are printed.

VARTAN and DISCOVER (p. 885) however record a case of quinine poisoning unconnected with malaria in which symptoms closely resembling those of blackwater fever were produced.

MARILL *et al* (p. 291) state that for the treatment of splenomegaly presumably caused by malaria but in many cases of which parasites cannot be found in the blood, intravenous medication with quinine, quinacrine and praequine in an ordered method is more successful than oral medication. The treatment is set out in detail. The course lasts for 9 weeks.

SOKHEY (p. 292) has studied the concentration of atehrin in the blood and tissues after oral or parenteral administration.

DUBSHIT (p. 745) shows that neither plasmoquine nor atehrin, in therapeutic doses influences the activity of non pregnant uterine muscle. In therapeutic doses plasmoquine does not pass the placenta, and even in doses toxic to the mother does not influence the respiration or cardiac action of the foetus. SOKHEY (p. 292) similarly reports that plasmoquine and atehrin in therapeutic doses are filtered out by the human placenta.

RANKINE (p. 746) found that treatment of subtertian malaria with acriquine and quinine 31 was effective and that schizonts and gametocytes rapidly disappeared from the blood.

CHRISTOPHERS and FRY (on p. 140) have investigated the dissociation constants of plasmoquine.

MOLLAREY and SCHREIDER (p. 457) describe the dygonic action of rhodopraequine which, when given subcutaneously after a number of paroxysms, arrests the fever without entirely destroying the parasites.

NIXON (p. 135) found that Palodex was not efficient in the treatment of *P. falciparum* infections in the Federated Malay States. As a result of the treatment of a considerable number of cases of malaria he (p. 134) concludes that Prontosil album is much less efficient and is more dangerous and costly than quinine. It is therefore not a useful addition to the therapeutic armament against malaria. YAMAMOTO (p. 746) reports unfavourably on sulphathiazide in malaria. FARIAUD and ELICHT (p. 185) however found that sulphonamide derivatives (soluseptazine and septazine) have remarkable schizonticidal activity though they are not efficient antipyretics. They have no action on gametocytes of *P. falciparum* but those of *P. vivax* are sensitive to the drugs. CHOPRA *et al* (p. 503) obtained good results, including the disappearance from the blood of sexual and asexual forms of *P. vivax* and asexual forms of *P. falciparum* by giving daily doses of 4 gm. M & B 693 for 5 days. CHOPRA *et al* (p. 186) report that Prontosil possesses mild anti-malarial properties against Indian strains of the three main species. GONZALEZ BARRERAS (p. 382) has obtained favourable results with Prontosil.

CLEVELAND and TURVET (p. 186) advise that if Mapharsen is used to terminate therapeutic malaria, a full course should be given. Reliance should not be placed on a single dose. YOUNG and McLENDON (p. 382) show that 10 weekly injections of Mapharsen do not eradicate infection with *P. malariae* although symptoms are relieved. Trypanamide has a similar effect.

GARRA (p. 965) has obtained success in treatment by intravenous antimony tartrate in cases of malaria, especially in primary infections. The drug has a remarkable effect on the enlarged spleen and causes improvement in the general condition.

MANCA (p 503) writes in favour of M_2 (manganese iodo-mercurate) in treatment and states that it has a prophylactic effect which is not immediate but which becomes evident from the first to the sixth month after treatment. He believes that it acts on the reticulo-endothelial system it has a tonic action and is well tolerated. CHOPRA and BASU (p 503) however found M_2 to be useless as a prophylactic in an experiment with 8 volunteers. CHOPRA *et al* (p 746) state that M_2 is useless in the treatment of malaria.

DECOURT *et al* (p 135) report unfavourably on Cilonal (Certuna) as a gametocide in *P. falciparum* infections. There was, however an improvement in the general condition of the patients and no intolerance was observed but the authors consider that the drug is less effective than either praequine or rhodoquine.

CASINI (p 363) reports unfavourably on the Ascoli method of treatment carried out on patients with uncomplicated malarial splenomegaly in Sardinia, and controlled by similar but untreated cases. Adrenalin in doses of 1/10 or 1/20 mgm. occasionally produced unpleasant symptoms and the full treatment did not cause reduction in the number of attacks diminution in the size of the spleen, or improvement in the blood or general condition. The work was carried out in spring and summer [and the patients were therefore probably liable to reinfection]. Very similar results are recorded by MAROTTA (p 363) in patients treated in Rome. These two papers differ remarkably from the enthusiastic reports given in recent years by other Italian workers who have employed the Ascoli method.

PIZZILLO (p 602) however who is a confirmed adherent of the method, reports that the late results of the Ascoli method of treatment of primary infections were excellent in 57 patients studied. He (p 364) claims that by using it he was able to cure the nervous symptoms (one cerebellar syndrome and two cases of sciatica) which arose as complications of malaria. FAIGUENBAUM (p 504) reports very favourably on the Ascoli treatment for both chronic and acute cases and DIAMANTI (p 504) obtained good results in 6 of 8 chronic cases.

Drug Prophylaxis

The papers on drug prophylaxis may be divided into those dealing with non-immune persons and those dealing with indigenous populations in which the people have probably been infected several times in the course of their lives. A division has here been attempted on these lines since it seems probable that drug prophylaxis may differ in its value and mode of application in the two groups.

In non-immune persons.—In a discussion of malaria in war CHRISTOPHERS (p 174) and other speakers remarked upon the necessity for planning in the provision of facilities for diagnosis and of larvicides sprays nets and other materials which might be called for by armies operating in malarious areas. Campaigning conditions however may be such that mosquito control is not possible and most of the speakers agreed that drug prophylaxis with either quinine or atabrin was an essential requirement and should be properly administered. Drug prophylaxis will not prevent infection but will prevent attacks of malaria. CASTELLANI (p 175) states that in the Abyssinian campaign the Italian forces suffered very little from malaria and attributes this to the rigidly enforced quinine prophylaxis. PANSINI (p 452) on the other hand, writing of Italian labourers repatriated from Abyssinia

on account of malaria states that many of these men had been taking prophylactic quinine in what are generally regarded as adequate doses when first attacked.

For Europeans in Liberia JUNG (p. 603) advises the daily administration of 0.05 gm. atebirin. This was in his prolonged experiments effective in preventing attacks of malaria and gave only slight coloration of the skin. Reduction of the dose to 0.3 gm. given on one day each week was followed, in most of the persons concerned, by attacks of quartan or subtertian malaria.

In indigenous populations.—As a result of a careful experiment carried out in Sardinia, and lasting for 3 years CASATI (p. 132) concludes that by atebirin or quinine prophylaxis especially if continued through the inter-epidemic period, accompanied by prompt treatment of all febrile attacks it is possible to reduce malaria symptoms, spleen rates and parasite rates and to effect a marked improvement in the health of a population but it is not possible thus to eradicate the disease. Details of administration are given. Atebrin was much more effective than quinine in preventing subtertian fever.

NIVEN (p. 131) shows that on an estate in Malaya, which is surrounded by swampy jungle where there is uncontrolled anopheline breeding drug prophylaxis with either atebirin or quinine was successful in suppressing clinical malaria. The dose of atebirin necessary was 0.3 gm. once each week, and this caused marked reduction in the number of gametocyte carriers. 1.0 gm. quinine once each week proved to be insufficient. It was found that cessation of drug prophylaxis was followed by a marked increase of clinical malaria.

In a district of Panama where for several years all persons found at monthly surveys to have parasites in the blood have been treated with atebirin (or quinine) and plasmoquine, CLARK *et al.* (p. 666) found that in an exceptionally dry year which favoured the breeding of anophelines in backwaters of rivers, epidemic malaria ensued. This experiment in drug prophylaxis has been tried over a period of several years in an area where anti-mosquito measures cannot be carried out.

RASHIMA and KHOVANEKAYA (p. 133) show that considerable results have been achieved in the reduction of malaria in the town of Khamché by treatment and drug prophylaxis. All persons with parasites in the blood were treated with acrinquine and plasmoquine and during the transmission season were given plasmoquine regularly. Irrigation canals are responsible for most of the anophelines, and the authors state that complete malaria control will necessitate anti-mosquito measures in addition to drug prophylaxis.

BAEZA (p. 133) reports a marked improvement in malaria and in general health in a small community in Perak in which plasmoquine alone was used as a prophylactic and in which anti-larval measures were not possible.

In tuberculous patients in Madagascar GARNIER and LAVERGNE (p. 864) have found rhodoquine, praequine and rhodopraequine to be of very definite value when given prophylactically. In the sanatorium in which the work was carried out almost all the tuberculous patients had suffered from malaria and reinfection with malaria was possible. This constitutes a serious complication of tuberculosis, especially in patients undergoing pneumothorax treatment, in whom an attack of malaria tends to produce pleural effusion. Rhodoquine is the drug

best tolerated and is the most effective. It is given in doses of 0.03 gm daily for 5 consecutive days each month and appears to prevent pleural effusion. The action of these drugs—described as dysgonic—is regarded as inhibitive rather than prophylactic but is effective for the purpose desired.

DUPOUX *et al* (p 134) in Tunisia give a curative treatment of premaline (an association of quinacrine and rhodopraequine) to persons found harbouring parasites and also distribute this drug to the population twice each month between 1st June and 1st November. No anti-mosquito measures were undertaken during the three years under consideration but the results of this drug prophylaxis were most remarkable and the only cases of malaria found were in persons arriving from outside the area in question. No relapses were seen in those treated for the disease who subsequently received the drug at bi-monthly intervals. Figures are given of the decline in parasite and spleen rates. GENEVRAY *et al* (p 293) have also used premaline as a prophylactic with success. In Tonking they found that administration every 10 days was insufficient but that when the drug was given weekly the spleen rates of children were greatly reduced, the parasite rates fell to zero, no case of malaria was seen and the general health improved though previously the incidence of malaria had been very high. The infection rate of *A. minimus* was only partly reduced. TOUMANOFF and HOANG-TICH TRY (p 187) show similarly that even a considerable reduction in the proportion of gametocyte carriers is not likely to result in great reduction of the infection rate of *A. minimus* if there is free contact between the mosquito and man. Drug prophylaxis therefore in this district is only likely to be useful if accompanied by antilarval measures.

CHOPRA and BASU (p 55) show that even large doses of Prontosil fail to devitalize crescents.

Control

General—CHRISTOPHERS and others (p 174) discuss the prevention of malaria among troops in war time. Anti-larval measures should, of course, be adopted where possible but it is probable that conditions will be such that the only practicable measures will be those applicable to the individual soldiers: their tents, huts or barracks. Mosquito repellents, nets, insecticidal sprays and the prophylactic use of drugs therefore are important and should be provided. All necessary apparatus for diagnosis should be provided.

ROBERTSON (p 792) has advocated measures for the protection of workers on the Chma Burma highway. For transport workers mosquito nets should be provided, screened hostels erected at parking places, vehicles in which drivers have to sleep should be sprayed with insecticide and quinine prophylaxis should be employed. More permanent measures on the usual lines should be used for the protection of labour gangs.

FARINAUD (p 136) gives a list of the measures of control which together with drug prophylaxis have been successful in causing a great decline in morbidity and mortality from malaria on an estate which had previously been a focus of heavy infection.

On coffee estates in Tanganyika Territory where *A. gambiae* is the principal vector WILSON (p 792) has employed oiling the filling of borrow pits and pools with cut vegetation and the construction of earth drains. The cost was about £12 per square mile and by

these means the malaria transmission season was reduced from 8 to 3 or 4 months in the year while anopheline infestation in the transmission season was reduced to one-sixth of its previous level. Anopheline infectivity was reduced from 4.6 to 3.6 per cent.

HOSWERS (p. 136) shows that in Kuala Lumpur malaria was caused by *A. maculatus* which were breeding at least a mile away and states that routine trapping of Anopheles at fixed points is essential. It allows of earlier extension of larval control than would otherwise be possible.

Drainage—BARROWMAN (p. 458) writing of the chances of subsoil drains laid near trees becoming choked by the roots, shows that if two pipe lines one above the other are laid, their effective life is six times as long as that of a single line. In suitable soils fascine drainage is an alternative to pipes for drainage near trees.

O'NEILL (p. 364) points out the difficulty of preventing the formation of pools in unlined road ditches, and describes the construction of concrete linings to prevent this.

COVELL and HARRISMAN (p. 740) have found herbage packing to be useful in controlling the breeding of *A. flavistilis* in rice-field drains. They point out that attempts to drain swamps in the past have provided increased breeding facilities for this dangerous vector in the Wynad district of S. India. Shading is a method suitable for estates.

BLACKLOCK (p. 284) discusses the functions and use of siphons and NICHOLAS (p. 283) describes a simple and effective automatic sluice used in Malaya.

Oiling—MURRAY (p. 294) has investigated the spreading power of oils used in larvicidal work. The findings cannot be further abstracted, but he states that commercial oils owe their spreading power to impurities which are only present in small quantities and which can be removed. DANILOVA and BUDUMKO (p. 505) report on acidol, a mixture of naphthalene acids obtained in the process of distillation of petroleum oils. It is highly toxic to larvae and pupae and spreads well at water temperatures of 25–31°C. but below 17°C. spreading is poor and the larvae are not killed. KUBO and OTTOMO (p. 365) have found a new and efficient larvicide oil in Dapros oil and Leave [? residual] oil, in equal parts, using 1 litre to 1.5–2 acres for rice fields. The oil does not harm the rice plant. In Delhi COVELL and AFREDDI (p. 747) use a mixture of diesel oil and creosol as a larvicide and emphasize the importance of the spraying of dwellings with pyrethrum insecticides.

Paris green etc.—In *Public Works* (p. 505) it is stated that the relative toxicity of any arsenical depends upon its fineness. The maximum particle size of ordinary Paris green is about 20 μ , but a new type (Anabacher's subsurface floating) with a maximum particle size of 3 μ has been prepared. This is lighter and floats for several hours, after which some passes through the surface film and floats directly beneath it. It is believed that this new type controls Anopheles better than the old type and also controls Culex.

CORRADETTI (p. 793) has used airplane dusting of Paris green in a localized area of Combolcia, together with mosquito proofing, spraying of insecticide and prophylactic quinine.

A table (p. 193) has been constructed to show the effects of various conditions on the dusting of Paris green from aircraft. The work of several authors during recent years is included.

Table showing the effects of various conditions on the dusting of Paris green from aircraft

101	Authors						
	Williams & Cook 1927 <i>Public Health Rep</i> Vol. 42, p. 459	Cook & Williams 1928 <i>Southern Med. J.</i> Vol. 21 p 754	Watson 1938 <i>This Bulletin</i> 1937 Vol. 34 p 71		Kiker Faurer & Flanary 1938 <i>This Bulletin</i> 1938 Vol. 35 p 805	Watson, Kiker & Johnson 1938 <i>This Bulletin</i> 1938 Vol. 35 p 512	Covell & Afridi 1937 <i>This Bulletin</i> 1937 Vol. 34 p 638
Speed of plane m p h.	65	60	100		80-80	80	70
Altitude of flight	100 ft. in 7 mile wind 200 ft. in bumpy air (& used 50 per cent. P.g.)	150-200 ft. in dead calm 25-40 ft. in 10-12 mile wind	50 ft.	150 ft.	20-25 ft.	25 ft.	75 ft.
Per cent. Paris green in dust mixture	25 in under 8 mile winds	25-33	11-12 5	11-12 5	20	20	33
Ibs. Paris green per acre	1	1	1	1	1	1	1
Width of strip dusted	at 100 ft. over open water 1/4-1/3 mile	at 50 ft. 200 yds.	520 ft.	560 ft.	200 ft.	300 ft.	120 yds.
Particles of P.g per sq in. of receiving surface	over 25 no vaseline on slide	28-69 no vaseline on slide	120	23 vaseline on slide	1 100 with 20% P.g. 437 with 10% P.g. vaseline on slide		over 25 to 100
Maximum wind vel ocity allowable	under 4 m.p.h. under 100 ft. alt. 25 per cent. P.g. over 4 m.p.h. over 100 ft. alt. 50 per cent. P.g.		under 5 m.p.h.				

SERGUTEV *et al* (p. 508) describe a motor pulverizer for distributing Paris green. It can be carried on a vehicle or a launch and with it larvae may be completely eradicated over an area of water up to 50 metres in breadth. It is more efficient in every way than a manual pulverizer can deal with larger areas and is cheaper to operate.

JURHAH and BOZHEVSKO (p. 295) write of the value of Paris green suspensions in water which are stated to be more effective, cheaper and more convenient than dust mixtures. Petroleum or naphtha increases the floatability of the Paris green and the following suspension is recommended—Paris green 0.6 kgm naphtha or petroleum 1 to 2 kgm suspended in water per hectare of surface to be treated. In Cyprus AZIZ (p. 187) has found that a uniform suspension of Paris green in water when sprayed on anopheline breeding places, gives better results than the usual dusting process and has the additional advantage of economy in that only one-third or one-quarter of the amount is needed. There is also a saving in time and labour and the danger of arsenical poisoning in the personnel is much reduced. SYDDIQ (p. 365) uses mud balls, weighing about 2 ounces and containing 2 per cent Paris green each ball being sufficient for about 4 cubic feet of water. The Paris green is liberated and is fatal to *Culex* as well as *Anopheles*. In rice fields periodic drying is effective against larvae but not so much so against pupae.

RUSSELL and JACOB (p. 506) report that for the control of anopheline larvae in *casuarina* pits, Paris green is effective, but that the best results are obtained by stocking the pits with *Gambusia affinis*. Naturalistic methods were found to be unsatisfactory.

SERGEANT (p. 187) draws attention to the fact that *Gambusia* eat their young and has devised a method of preventing this in breeding tanks.

Insecticidal sprays.—COVELL (p. 866) points out that in small isolated communities where other methods are not economically feasible the spraying of insecticides within houses, under adequate organization and supervision merits further trial. The cost of spraying compares favourably with that of temporary anti-larval measures. RUSSELL and KATZ (p. 504) report considerable success in the prevention of malaria in a village in Madras by the spraying of houses with a mixture of kerosene 19 parts, and Pyrethide 20 one part. Spraying once a week from June to December was markedly effective and spraying twice a week even more successful. The cost however was higher than the people could be expected to afford. DE BURCA (p. 58) reports satisfactory results from the regular spraying of barracks in Quetta with the same mixture. A local fish was found to be efficient in destroying anopheline larvae and pupae. FRATANI (p. 496) reports Oran has also found a local fish to be useful. CLOVER (p. 868) reports great success in Natal in the control of malaria by the weekly spraying of houses with a mixture of pyrethrum and commercial paraffin. The vectors concerned are *A. gambiae* and *A. funestus* both exclusively anthropophilic and house-frequenting. Labour and economic conditions have shown a marked improvement since the method was adopted.

In discussing control measures in Mombasa, where considerable numbers of adult *A. gambiae* are brought to the island in trains from the mainland, WISEMAN *et al* (p. 786) advocate measures for the destruction of adults in trains. *A. gambiae* probably reaches the island

by direct flight from the mainland and experiments with stained *Aedes aegypti* have shown that it too can fly from the mainland to the island.

Malaria of Birds and Monkeys

Birds

GIOVANNOLA (p 367) has published an extensive discussion of the bird malaria parasites. [Reference may also be made to a recent book by HEWITT on bird malaria reviewed in this *Bulletin* 1941 Vol. 38 p 120]

TADDIA and VIERO (p 793) favour the view that exo-erythrocytic schizonts do not represent an essential stage in the life cycle of *P. relictum* but that they occur as a result of the increased number of phagocytic cells in the reticulo-endothelial system caused by the malarial infection.

JAMES (p 59) shows that in fowls inoculation with sporozoites of *P. gallinaceum* produces exo-erythrocytic schizonts in the acute stage of infection, but blood inoculation produces these forms more especially in the chronic stage. There is a higher rate of mortality when these exo-erythrocytic forms are present than when they are not. It appears that these forms can arise from parasites which have developed in red blood cells because in 70 per cent. of the infections resulting from blood inoculation they do not appear until after the acute phase has passed. MANWELL and GOLDSTEIN (p 60) state that exo-erythrocytic schizonts of *P. circumflexum* appear in canaries most commonly just after parasites first appear in the peripheral blood.

CHORTIS (p 459) considers that in *P. gallinaceum* infections exo-erythrocytic schizonts are the result of imperfect phagocytic action of the endothelial cells which allows the ingested forms to develop instead of destroying them.

MISSIROLI (p 671) considers that the sporozoites of canary parasites if mature may develop at the site of inoculation, but if less mature they first migrate to the spleen. The sporozoite becomes ovoid and divides into 4 units and this process takes place extracellularly. These bodies may then enter red blood cells or reticulo-endothelial cells to produce respectively pigmented and non pigmented parasites. From a study of the development of sporozoites of *P. cathemerium* injected into the muscles of canaries KIRUTH and MUDROW (p 671) conclude that the sporozoite first enters an endothelial cell and becomes an exo-erythrocytic schizont. The merozoites from this may infect other endothelial cells or red blood cells. These authors (p 188) believe that exo-erythrocytic schizonts result only from sporozoites or merozoites or other exo-erythrocytic forms but that merozoites of these forms may give rise to exo-erythrocytic or to pigmented forms in the red blood cells. Merozoites of the red cell forms on the other hand, cannot produce exo-erythrocytic forms. The precursors of the exo-erythrocytic forms of *P. cathemerium* occur in blood and can be transferred by blood inoculation but this does not hold in the case of *P. relictum*. By subinoculation with liver emulsions (in which the exo-erythrocytic forms are numerous) a fairly stable infection with *P. cathemerium* with large numbers of these forms, was produced, and the effects of quinine atebirin certuna and plasmoquine given from the time of inoculation were tested. Of these only plasmoquine affected the exo-erythrocytic forms reducing the numbers

though not eliminating them. With sporozoite infections of *P. relictum* the results were similar except that both Certuna and plasmoquine cured the infections. The general conclusion is that all the drugs have an action on the pigmented blood forms but plasmoquine alone has some action on the non-pigmented exo-erythrocytic forms in the cells of the reticulo-endothelial system.

From experiments with *P. calhemerium* BORD and DUNN (p. 189) conclude that quinine and plasmoquine each reduce the rate of reproduction rather than increase the normal destruction of the parasites. This affords an explanation of why quinine fails to eradicate an infection but reduces it to a low level.

DECOURT *et al* (p. 458) show that in fowls infected with *P. galli* *saccharum* there occurs a phase in which after being infective the blood becomes non-infective to other fowls although it still contains parasites.

WOLFSON and CAUSEY (p. 672) show that canaries which have recovered from *P. calhemerium* infection induced by blood inoculation are immune to both trophozoite and sporozoite inoculations. MAXWELL and GOLDSTEIN (p. 508) find that strains of *P. circumflexum* protect against each other and that *P. rouxi* produces a strong immunity against *P. circumflexum* but not *vice versa*. REDMOND (p. 58) has shown that cross immunity between a strain of *P. calhemerium* and one of *P. relictum* can be induced by repeated superinfection of birds with the former.

MAXWELL and GOLDSTEIN (p. 784) have conferred passive immunity on canaries by injecting serum from canaries hyperimmunized against *P. calhemerium*. This serum is more effective when given before infection than when given after. HEGNER and DOBLER (p. 506) have conferred a slight degree of passive immunity in canaries by injecting serum or spleen emulsion of infected birds.

CAUSEY (p. 507) found that injection of the blood of a duck infected with *P. calhemerium* into splenectomized and non-splenectomized canaries produced infection only in the former but that the blood of an infected canary produced infection in both. He regards this as due to the action of the spleen in removing foreign red blood cells rather than to a destructive action on the parasites.

Monkeys

CHRISTOPHERS and FULTON (p. 190) have isolated *P. knowlesi* from red cells by the use of asponin which removes not only the haemoglobin but also the stroma of the red cells. The parasites were viable and exhibited a small oxygen uptake which was increased by the addition of glucose. FULTON (p. 509) has shown that *P. knowlesi* utilizes glucose, laevulose, maltose, mannose and glycerol by oxidation. The blood sugar and liver glycogen of heavily infected monkeys are much lower than those of normal animals.

SOMOGYI (p. 190) has shown that the serum of monkeys with chronic *P. knowlesi* infection can agglutinate the red cells of other monkeys if 5 to 10 per cent of these cells contain mature parasites.

EATON and COGGESHALL (p. 368) show that complement fixing antibodies, but not protective antibodies, are produced in monkeys by the injection of killed *P. knowlesi* though the latter are provoked by living *P. knowlesi*. The parasitocidal property of serum after infection appears to be due to an anti-erythrocyte substance.

SINGH and SINGH (p. 190) show that M and B 693 is capable of eradicating *P. knowlesi* infection in monkeys, but the doses necessary

are considerably greater in proportion than those usually given in man. COGGESHALL (p 670) shows that sulphanilamide may eradicate infection with *P. knowlesi* but may leave *P. mui* unaffected. In smaller doses the drug almost completely inhibits the oxygen consumption of *P. knowlesi* but has no effect on the respiration of *P. mui*.

FULTON (p 795) shows that the aromatic amidines given intravenously have a definite action against *P. knowlesi* in that they render the infections non fatal, though relapses occur. The drugs inhibit the oxygen uptake of the parasites *in vitro*. On *P. relictum* of birds the actions of the different preparations vary.

By inoculating *P. vivax* into a chimpanzee and after an interval of 46 days inoculating human paretics with the blood of this chimpanzee and producing *P. vivax* infection in those paretics RODHAIN and MUYLLE (p 61) have proved that *P. vivax* can live for at least 46 days in the animals. *P. schweileri* the comparable parasite of the chimpanzee is not infective for man. RODHAIN (pp 367-669) produces further evidence that *P. reichenowi* of the chimpanzee differs from *P. falciparum* of man and that *P. schweileri* of the chimpanzee does not infect man whereas *P. vivax* of man produces inapparent but true infection of the chimpanzee.

RODHAIN and LASSMAN (pp 459-509) conclude from their work that the young forms of *P. vivax* and *P. gondii* reveal a definite preference for immature red blood cells. Charles Wilcocks

THE TYPHUS GROUP AND OTHER FEVERS

PRÉCIS OF ABSTRACTS IN THIS SECTION

Louse and flea borne—RUGE and SCHILLING (p 199) discuss the possibility of the occurrence of typhus without a rash quoting a number of authors who have reported such cases. Towards the end of an outbreak when immunity may be relatively high the rashes become slighter.

MARIANI (p 199) discusses three species of *Rickettsia* found in Addis Ababa *R. prowazeki*, *R. pediculi* and *R. rocha-limae*. The first is that of classical typhus the second may occasionally be pathogenic for man but *R. rocha-limae* abundant in the louse is not pathogenic for man or experimental animals.

BORRA (p 200) gives a description of the clinical picture of typhus in the highlands of Abyssinia. D'IGNAZIO *et al* (p 200) in Abyssinia have studied the cerebrospinal fluid of patients with typhus. At first it is clear but under pressure later it may become haemorrhagic albumin increases and the cellular content becomes high the majority of the cells being polymorphonuclears. SANGIOVANNI (p 201) writes of a toxic neuritis which occasionally follows typhus and which appears to have a predilection for the auditory nerve. GUERRA (p 201) describes the eyes in typhus. Congestion of the conjunctiva is common in severe cases there may be swelling of the corneal epithelium with shedding of the surface layers and inflammatory oedema of the optic nerve may be seen.

LIU *et al* (p 202) have investigated typhus in Peiping. In small epidemics the patients are lousy and ill-nourished and the disease is severe in sporadic cases the patients are not lousy but come from

rat-infested houses. Animal tests on strains recovered from patients (with the endemic disease) rats and rat fleas gave conflicting results, and the authors conclude that local orchitic and non-orchitic strains are all of the murine type. It remains to be determined whether the louse-borne type corresponds with the epidemic murine type or with the classical human type. KAKU (p. 203) records a laboratory infection with murine typhus. In papers in the *Vide Vires* (p. 203) the opinion is expressed that the typhus of Pinar del Rio is of the murine type. Agglutination of *Proteus* OX19 takes place in high titre.

GREEN *et al* (p. 203) found a low incidence of agglutinins for *Proteus* OX19 in Southern Arizona.

Tick-borne—ALEXANDER *et al* (p. 203) have carried out an investigation of 4 strains of tick-borne typhus virus and one strain of murine virus. In group I (tick-borne type) the parasites were numerous in nuclei of cells cultivated in egg medium did not readily infect guineapigs, and did not usually provoke agglutination of *Proteus* OX19. Group II (murine) did not show intranuclear parasites readily infected guineapigs and provoked a reaction to *Proteus* OX19. The viruses of Group I protected against each other but not against Group II (murine) but Group II protected against itself and against Group I. It is suggested that the viruses of Group I are in the Rocky Mountain fever group and that the virus of Group II is in the typhus fever group. FENLTON *et al* (p. 205) have isolated a virus from a batch of ticks (*Hyalomma aegyptium*) from a cow in S Africa. There is no cross immunity between this and murine or louse-borne typhus viruses. It is probably a tick-bite fever virus but has points of similarity with that of Q fever.

MAIL (p. 205) gives an account of the bionomics and control of *Dermacentor andersoni* the vector of Rocky Mountain fever, tularemia and tick paralysis.

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Mite-borne—NICHOLLS (p. 206) reports a case of tsutsugamushi fever from Ceylon.

Vaccination—LIV and ZIA (p. 207) show that the Weil-Felix reaction was strongly positive in 60 per cent of persons vaccinated with killed Weigl vaccines, and in 80 per cent. of those who received killed tissue culture vaccine. PANG *et al* (p. 207) have used mouse embryo tissue with success in the cultivation of typhus *Rickettsiae*.

OTTO and WOLFRUM (p. 207) write of the advantages of using mice instead of guineapigs in protection tests with *R. mooseri*.

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MARIANI (G) *Rickettsia prowazeki pediculi rocha-limae* nei pidocchio raccolti negli ambiente indigeni dell'altipiano etiopico (Nota preventiva.) [Types of *Rickettsia* found in Lice on Inhabitants of the Ethiopian Uplands]—*Minerva Med* 1940 Jan. 28 No 4 pp 69–72. With 5 figs. & 6 microphotos.

Three species of *Rickettsia* have been distinguished in Addis Ababa *R. prowazeki*, *R. pediculi* and *R. rocha-limae* The first is pathogenic for man the second usually non pathogenic but becomes pathogenic occasionally the third is not pathogenic for man or experimental animals.

In the louse the first-named develops abundantly intracellularly causing the death of the insect in 4–10 days Guinea pigs infected intraperitoneally show in 80 per cent. of cases a rise of temperature of 1.5°–2°C lasting for 5–8 days no scrotal reaction and a low mortality under 5 per cent. *R. pediculi* develops extracellularly but guinea pigs inoculated peritoneally fail to react in any way *R. rocha-limae* develops well, rapidly and abundantly intracellularly in the louse, without killing the insect. Intraperitoneal inoculation into guinea pigs causes no obvious reaction but these animals and also white mice and rabbits vaccinated with killed *Rickettsia* produce agglutinins to *R.*

provarachi and *R. rocks-Jonas* but reinoculation with *R. provarachi* gives rise to disease [see also this Bulletin 1940 Vol. 37 p. 578] H H S

BORRA (E.) Particolarità cliniche delle Rickettsiosi umane sull'altipiano etiopico. (Nota riassuntiva.) [Clinical Aspect of Human Rickettsiosis in the Ethiopian Uplands.]—*Minerva Med.* 1940. Jan 23 No 4 pp 72-76

The average incubation period is 15-16 days, during which the patient may exhibit such symptoms as malaise, weakness, vertigo, nausea, lumbo-sacral pains, injection of the conjunctivae. Then comes a rise of temperature which may be gradual or abrupt but continues for 9-11 days before falling by crisis occasionally one or two pseudo-crises precede the true critical fall. Rash appears on the fourth or fifth day as small pale rose spots, at first fading on pressure then becoming large and petechial. In about half the cases or less the rash is moderate in extent macular in type and affects the thorax, abdomen and back. Nervous manifestations are usually more marked after the first week, and include headache and insomnia (also in the prodromal period) and a typhoid state sometimes rigidity, myoclonia, carpal spasm, subcortical Cheyne-Stokes respiration are observed. Cardio-vascular complications include myocarditis (with cyanosis), small rapid pulse, arrhythmia and perhaps gallop-rhythm as a result of vascular changes local necrosis and gangrene may occur and haemorrhages from gums, nose and intestine H H S

D'IGNAZIO (C.) LOMBARDI (A.) & D'ARCANGELO (D.) L'esame del liquido cefalo-rachidiano nel tifo esantematico [The Spinal Fluid in Exanthematic Typhus.]—*Minerva Med.* 1940 Jan 28. No 4 pp 78-80

The authors have studied the cerebrospinal fluid from 23 typhus patients and find the following changes. The fluid is present under increased pressure which may persist for as long as three months after convalescence. It is clear in the first week in all cases, and may remain so but in those seriously ill it becomes turbid owing to the presence of red corpuscles and in very grave cases the fluid may be frankly haemorrhagic. The amount of albumen varies from 0.2 per thousand in mild cases in the first week, to 0.4 or 0.5 towards the end of the second week. In a few 20-30 per cent of cases, which are very grave the amount may rise to 0.7-1.0 per thousand. A mild Pandy reaction may be seen towards the end of the febrile period, otherwise the globulin reactions are normal. The cellular contents range in a mild case from 10 per cmm. to 30-40 at the end of the febrile period and the first week after in severe cases and those likely to prove fatal the number may reach as high as 300 per cmm., the majority being polymorphonuclears. In about one-fifth of the patients the chloride and glucose content are normal in grave cases chlorides are diminished to 5-6 per thousand and glucose increased to 0.7-1.0 per thousand. Signs of grave import are progressive neutrophile leucocytosis and haemorrhage in the fluid. H H S

SANGIOVANNI (V) Considerazioni su alcune alterazioni funzionali dell'apparato uditivo negli ammalati di tifo esantematico [Functional Disturbances in the Auditory Apparatus in Typhus.]—*Minerva Med.* 1940 Jan. 28 No. 4 pp 81-83

The author has studied 30 cases of typhus and as regards visible changes he finds the membrana tympani normal in 26 opaque in 17 and inflamed in 7 one patient had to be operated upon for mastoiditis. Functional changes were more common, due, it is thought, to a toxic neuritis like that which occurs after exhibition of certain drugs quinine, salicylates etc. The effect may be on peripheral motor nerves peroneal and ulnar for example but there seems to be a predilection for the auditory.
H H S

GUERRA (P.) Le alterazioni oculari nel tifo esantematico (Nota preventiva.) [Eye Changes in Typhus.]—*Minerva Med.* 1940 Jan. 28 No. 4 pp 83-85

The observations embodied in this article were the results of study of over two hundred cases of typhus in Addis Ababa in 1938 and 1939. The changes described are those affecting (a) the conjunctiva (b) the cornea (c) the fundus.

(a) *Conjunctiva*.—Congestion is noticed towards the end of the first week of illness then becoming more marked from day to day. The episcleral vessels are turgid. In some the signs do not appear till the twelfth day and then come on suddenly and acutely. This symptom subsides with the fall of the fever and has usually disappeared when the temperature has been normal for 3-4 days. There is no discharge from the conjunctiva.

(b) *Cornea*.—In very serious cases (and in the majority of these death occurs) there may be seen a localized swelling of the corneal epithelium, and soon afterwards the surface layers are shed. The site involved is usually the periphery or is at least paracentral. The lesion may extend and invade nearly a fourth of the cornea.

(c) *Fundus*.—About the sixth day an inflammatory oedema of the optic nerve may be seen, at a time when the patient is still conscious but is becoming sensorily obtuse. For the next 8-10 days this may increase, then slowly recedes after the crisis but may be noticeable as long as twelve days after the temperature reaches normal. The vessels especially the veins are dilated and congested, then the papilla becomes oedematous and swollen, and, rarely small whitish spots are seen on the retina, as in albuminuria retinitis. Haemorrhagic foci have not been observed.

[The above five papers are accounts of observations carried out at the laboratory for the study of Rickettsioses in Addis Ababa three at least are preliminary notes.] Should present conditions in Abyssinia continue to develop on the lines of the past weeks a long time will probably elapse before Italian authors will be in a position to amplify these notes. Hence slight though they are they have been thought worth brief abstracts in this *Bulletin*.
H H S

MOSK (F.) Ueber die cerebralen Krankheitserscheinungen beim Fleck fieber [Cerebral Symptoms in Typhus.]—*Med. Klin.* 1940 Apr 26 Vol. 36 No. 17 (1844) pp 452-454.

LIU (Wei-Tung) CHUNG (Huei-Lan) & ZIA (Samuel H.) Experimental Studies on Typhus Virus in Peking with Particular Reference to a Non-Orchitic Murine Strain Isolated from a Patient.—*Chinese Med J* 1940 Mar Supp 3. pp 588-628 With 12 figs. on 6 plates [51 refs.]

Of recent years there has been a considerable number of cases of typhus fever in Peking. Several small epidemics have occurred and the patients when admitted to hospital were found to be lousy and ill nourished. Clinically these cases were severe in type and there were some deaths. On the other hand sporadic cases have been admitted and these people were not lousy but they came from houses which were rat infested, the clinical type of these cases was mild.

It has been suggested on the one hand that these two types of case are due to one and the same virus (the murine virus) modified in the first instance by passage through louse and man or else that the first type of case is due to the historic human virus and the second to the murine virus.

A review of the literature on the subject is included in the paper and an investigation was carried out. Seventeen strains of virus were investigated, 6 from cases of fever (these cases were considered to be of the endemic variety) five from rats caught in the houses from which the patients came and 6 from fleas removed from these rats.

It is emphasized that in any investigation of this kind it is not sufficient to study only the action of the virus on guinea-pigs but the action on rats and mice must also be investigated. A strain of typhus virus which does not produce orchitis in guinea-pigs is not necessarily a historic human virus as it may produce fever in rats and mice and be capable of prolonged passage in these animals. There are some murine types which are virulent for rats and mice but which do not give orchitis in guinea-pigs.

All the 5 strains recovered from rats in this investigation produced marked orchitis in guinea-pigs and fever in white rats and mice but of the 6 strains isolated from fleas removed from these rats 4 produced orchitis in guinea-pigs, one produced only a slight reaction and one none at all and only an inapparent infection in rats, the 4 strains which originally produced reaction lost this property when passaged in guinea-pigs. Of the 6 strains isolated from cases of endemic typhus one gave marked orchitis in guinea-pigs, one showed a slight reaction, and 4 no reaction at all, but the typhus lesions in the brains of these animals were few in number. Otherwise there was nothing to distinguish these strains from the historic human virus so far as the animal experiments were concerned. Passage of these strains in guinea-pigs reduced their virulence for rats but if these strains were subsequently passaged in rats they regained their virulence and produced fever and in some cases the animals succumbed.

The authors conclude that the local orchitic as well as the non orchitic blood strains are all of the murine type. Some being more or less typical in their behaviour in experimental animals. It is pointed out that when one is dealing with such atypical murine strains (non-orchitic) isolated from human cases difficulties or errors may arise if the hitherto generally accepted criteria are rigidly adhered to in the differentiation of the two types of typhus virus. It is suggested that on the basis of clinical and experimental evidence both louse-borne typhus and flea-borne typhus exist in Peking but it remains to be

determined whether the louse-borne typhus corresponds with the epidemic variety of murine typhus as has been described by MOOSER, or to the historic human type according to the definition of NICOLLE and ZINSSER
D Harvey

KAKU (Sōkan) *Klinische Seite des Zweiwochen Fiebers (Febris exanthematica sporadica) in Formosa. III Teil Ueber einen Infektionsfall im Laboratorium. [A Clinical Study of "2 Weeks Fever" (Endemic Typhus) in Formosa. An Accidental Infection in the Laboratory]*—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1940 Sept Vol 39 No 9 [In Japanese pp 1401-1406 With 1 chart German summary p 1407]

Eight days after a puncture of a finger caused by the needle of a syringe charged with infective material from a guinea pig the author developed fever with severe headache. A typical typhus rash appeared on the 4th day and on the 13th day the fever ceased. Blood was taken on the 8th day of the fever and inoculated into a guinea pig but without result. However as the clinical symptoms were typical and a positive Weil Felix reaction developed, the diagnosis was considered as established.
D H

VIDA NUEVA. Habana Cuba. 1940 Aug Vol. 46 No 2. pp 65-144 Numerous figs.—Número dedicado a la investigación de tifus Pinareño [Typhus in Pinar del Rio]

This number is devoted to a congress discussion of typhus as it is found in Pinar del Rio - Agglutination of *Proteus OX19* takes place in high titre and it is thought that the disease is similar to Brill's disease.
C W

GREEN (Robert A.) BREAZEALE (Edward L.) & HARDING (Harry B.) *Incidence of Agglutinins for Proteus OX-19*—*Southwestern Med* 1940 Sept Vol 24 No 9 pp 300-301

In a study of 10 000 sera from man in S. Arizona it was found that 32 (0.32 per cent.) agglutinated *Proteus OX19* antigen. With two exceptions there was no history or suspicion of typhus or typhus-like infections. It would appear therefore that the incidence of agglutinins for *Proteus OX19* is quite low among the population of Southern Arizona.
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ALEXANDER (R. A.) MASON (J. H.) NEITZ (W. O.) *Studies of the Rickettsias of the Typhus-Rocky-Mountain-Spotted-Fever Group in South Africa. I. Isolation of Strains* [ALEXANDER MASON & NEITZ]—*Onderstepoort Jl Vet Sci & Animal Industry* 1939 July Vol 13 No 1 pp 19-23 II. Morphology and Cultivation [ALEXANDER & MASON]—*Ibid* pp 25-39 With 1 chart & 8 figs. on 2 plates III. The Disease in the Experimental Animal. Cross-Immunity Tests [MASON & ALEXANDER]—*Ibid* pp 41-65 With 7 charts. IV. Discussion and Classification [MASON & ALEXANDER]—*Ibid* pp 67-76 [34 refs.]

Five strains of virus were employed in this important series of researches they were as follows —

(a) A rickettsial virus obtained in Pretoria from the blood of a dog suffering from a febrile illness.

LIU (Wei-Tung) CHUNG (Huei-Lan) & ZIA (Samuel H.) Experimental Studies on Typhus Virus in Peiping with Particular Reference to a Non-Orchitic Murine Strain Isolated from a Patient.—*Chinese Med J* 1940 Mar Supp 3 pp. 588-623. With 12 figs. on 6 plates [51 refs.]

Of recent years there has been a considerable number of cases of typhus fever in Peiping. Several small epidemics have occurred and the patients when admitted to hospital were found to be lousy and ill nourished. Clinically these cases were severe in type and there were some deaths. On the other hand, sporadic cases have been admitted and these people were not lousy but they came from houses which were rat infested, the clinical type of these cases was mild.

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The authors conclude that the focal orchitic as well as the non-orchitic blood strains are all of the murine type. Some being more or less typical in their behaviour in experimental animals. It is pointed out that when one is dealing with such atypical murine strains (non-orchitic) isolated from human cases difficulties or errors may arise if the hitherto generally accepted criteria are rigidly adhered to in the differentiation of the two types of typhus virus. It is suggested that on the basis of clinical and experimental evidence both louse-borne typhus and flea-borne typhus exist in Peiping but it remains to be

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Five strains of virus were employed in this important series of researches they were as follows—

(a) A rickettsial virus obtained in Pretoria from the blood of a dog suffering from a febrile illness.

(b) A rickettsial virus isolated from ticks (*Hyalomma aegyptium*) collected from a wild hare.

(c) A strain of virus from a case of African tick bite fever in Pretoria.

(d) A strain of virus isolated from ticks (*R. sanguineus*) sent from the Pasteur Institute of Tunis and collected from dogs.

(e) A strain of the local murine endemic typhus virus.

These strains were maintained by passage in guinea-pigs or by serial cultivation on the membranes of chick embryos.

The second paper gives a description of the methods of cultivation and of the microscopical appearances demonstrated. When studied in smears from the exudate of the inflamed testicle of infected guinea-pigs it was found that viruses *a*, *b*, *c* and *d* (Group I) were similar in appearance that is in the early stages only a few Rickettsiae could be seen and these were scattered about in the cytoplasm of the monocytes and serosal cells and not aggregated in clumps whereas in smears from guinea-pigs infected with virus *e* (Group II) i.e. murine typhus there were masses and clumps of Rickettsiae in the serosal cells and the individual parasites were longer and finer and more delicate than those of Group I. There was also marked polymorphism of the parasites in the murine typhus virus smears.

When smears from the viruses cultivated in egg medium were examined it was also possible to divide the viruses into two groups. In Group I the four viruses *a*, *b*, *c* and *d* gave similar results—scanty parasites were seen in the cytoplasm of monocytes and serosal cells these were more numerous than in the smears from testicular exudates but most remarkable was the presence of numerous typical intra-nuclear forms whereas with the Group II murine virus, although the serosal cells contained masses of delicate polymorphic Rickettsiae there was none whatever within the nuclei of the cells.

An interesting observation was that although in many of the smears from testicular exudate no Rickettsiae could be seen, yet the material was highly infective for guinea-pigs.

As regards reactions in animals it was also possible to place the viruses in 2 groups. The murine typhus virus (Group II) readily infected guinea-pigs and could be passaged indefinitely producing a constant or almost constant scrotal reaction. White rats were also readily infected.

As regards Group I the viruses did not readily infect the guinea-pig, although if large doses of virus from the egg cultures were employed infection occurred and, as a rule, scrotal reaction and enlargement of the spleen was observed, but the viruses were not readily passaged and had to be renewed from time to time from cultures. The virus *b* from the hare was the most virulent of this group for guinea-pigs but no infection was obtained in rats or mice whereas with virus *c* guinea-pigs were only infected with difficulty but rats showed evidence of infection.

As regards the Weil-Felix reaction 10 rabbits inoculated with murine typhus virus gave a positive reaction with *Proteus* OX19 whereas only one out of 10 rabbits gave any reaction with viruses of Group I and this only in low dilution.

Tests were also carried out to show the duration of the viability of the viruses in the brains of experimental animals. As regards cross immunity experiments it is emphasized that it is important in immunity experiments, to carry out many tests in work of this kind as a rule for each experiment 6 tests each on 2 animals were used. The results were as follows.—The virus of rat typhus protected animals

against itself and also against the four viruses in Group I. The 4 strains of virus in Group I protected against themselves and also against the other members of the group but did not protect against the virus of rat typhus. These experiments showed that the 4 viruses in Group I : i.e. the viruses of African tick bite fever and boutonneuse fever were immunologically related whereas they were definitely distinct from the rat typhus virus.

The authors suggest that in conformity with PINKERTON'S classification the Group I strains of tick bite fever are in the Rocky Mountain fever group and Group II strain of murine typhus in the typhus fever group [see this *Bulletin* 1936 Vol. 33 p 907] D H

FINLAYSON (M H) GROBLER (J M) & SMITHERS (R.) *Studies in South African Blokettales*—*South African Jl Med Sci* 1940 July Vol 5 No 3 pp 41-45

Little is known of the vector of African tick bite fever in the Cape Colony. The authors therefore carried out an investigation and collected a large number of ticks. These were divided into batches of 25 to 50 and about 1 000 ticks in all were examined.

From one batch of ticks (*Hyalomma aegyptium*) collected from a cow a virus was isolated by injection into guineapigs. This has now been passaged for 40 generations and produced fever, scrotal reactions and enlarged spleen in these animals. In rats and mice an inapparent infection occurred and there was evidence of the survival of the virus in the brains of rats for at least 30 days. Injection of the virus into rabbits did not produce any evidence of infection and no agglutinins were formed in the blood for any of the strains of *Proteus X* tested. It was found that guineapigs which had recovered from the infection with this virus were not protected against the virus of African murine or louse-borne typhus. On the other hand animals which had been inoculated with the typhus viruses were protected against the Cape tick virus. The authors consider that this virus isolated from ticks (*H. aegyptium*) collected from a cow in the Cape Colony is probably a tick bite fever virus but they also point out that there are points of similarity with the virus of Q fever of Australia and America. D H

MAIL (G A) *The Paralytic Tick Dermacentor andersoni Stiles Its Life-History and Control*.—*Publ Canada Dept Agric Ottawa* 1940 No 692 (Circ. 161) 4 pp [Summarized in *Rev Applied Entom Ser B* 1940 Nov Vol. 28 Pt. 11 p 216]

Much of the information contained in this brief account of the bionomics, economic importance and control of *Dermacentor andersoni* Stiles, in Canada has already been noticed from other sources. It is the most important of the 22 species of ticks that have been found in Canada because of its relation to disease (Rocky Mountain spotted fever in man and tularemia and tick paralysis in both man and domestic animals). It is also the tick that most commonly attacks man in western North America. It is distributed throughout the dry belt of British Columbia and in southern Alberta and south western Saskatchewan. It does not occur on the coast of British Columbia or in eastern Canada. The measures recommended for the control of ticks on live-stock include dipping three times at intervals of 10 days beginning when the ticks first appear in spring. An effective dip is

composed of 24 lb. sodium carbonate 8 lb. white arsenic, 1 gal. tar oil and 500 gals. water. Where a dipping vat is not available there are only a few animals, dipping fluids may be applied by means of a sprayer. For cattle, a dressing consisting of about 3 parts of cottonseed oil or raw linseed oil, mixed with 1 part pine tar oil, applied from the back of the head, along the neck, over the peak of shoulders and half way along the back, will usually kill most of the attached ticks, prevent reinfestation for some time and help to the attacks of blowflies. On horses ticks often attach themselves to the jaw on the belly and between the hind legs. It is sometimes advisable to clip the mane before a dressing is applied, since many of ticks are sometimes found hidden under the long hair. When possible, stock should be confined in fenced, tick free pastures during the period of tick activity in the spring months from the latter of March to the end of June. A method of poisoning rodents on the immature ticks feed, the symptoms and treatment of tick poisoning and the way in which ticks should be removed from man are described.

CAMPBELL (Eugene P.) & KETCHUM (Walter H.) Rocky Mountain Spotted Fever. An Analysis of Seven Cases, including One Laboratory Infection.—*New England J. of Med.* 1940 Oct. Vol 223. No 14 pp 540-543. With 2 figs. [15 refs.]

During the years 1931 to 1939 inclusive 7 patients were admitted to the General Hospital in Washington with Rocky Mountain fever; three of these died. Six of the cases were locally contracted and were therefore Eastern State cases but one in a medical span was contracted in the hospital laboratory and was due to the Western States virus of Rocky Mountain fever.

This patient made a good recovery after an illness definitely more severe than that of one of the patients with the Eastern type who was in hospital at the same time yet as the authors say the characteristic serving to differentiate these 2 cases were in no way sufficient to themselves to be of general differential value.

As already stated 3 of 6 Eastern type cases were fatal but of 2,000 cases taken from reviews the fatality rate was in 1,400 Western type cases 19.4 per cent. in 600 Eastern type cases 18.1 per cent. D. H.

COREN (Milton H.) An Unusual Case of Rocky Mountain Spotted Fever in Southeastern Pennsylvania.—*J. Amer. Med. Assoc.* 1940 Oct 26. Vol 115 No 17 pp. 1441-1442. [14 refs.]

A case of fever with a profuse macular rash and a positive Weil-Felix reaction. Some time after the fever had ceased a sample of blood was taken and this gave strong protection for guinea pigs against Rocky Mountain fever virus. The interesting points about this case were that instances of this type are very rare in south-eastern Pennsylvania the case occurred in December when ticks are not met with, and there was a definite relapse of the fever but without rash 3 weeks after the initial attack. D. H.

NICHOLLS (Lucius) A Case of Tetrugamushi (Rural Typhus) in Ceylon. [Memoranda].—*Brit. Med. J.* 1940 Oct 12 p 490. With 1 chart.

A European resident shooting trip to the east

developed fever 10 days after a severe fever lasted 3 weeks.

primary sore was noted on the thigh there was a profuse macular rash all over the body and the Weil Felix reaction was positive for *obtus OXA*. In accordance with the work of LEWTHWAITE the case was diagnosed as tsutsugamushi fever not rural typhus [see this *Illness* 1940 Vol. 37 p 847] D H

U (P Y) & ZIA (Samuel H) **Well Felix Reaction following Typhus Vaccination**—*Chinese Med J* 1940 Mar Supp 3 pp 487-494 [10 refs.]

Owing to the prevalence of typhus in Peiping a considerable number doctors and nurses on the staff of the local hospitals have been inoculated with typhus vaccine. Both the vaccines employed were killed vaccines one was prepared from infected lice according to the method of Weigl and the other was prepared from tissue cultures of the same virus as that used in the louse vaccine. About 60 per cent. of those inoculated with the louse vaccine gave a strong positive Weil-Felix reaction and 80 per cent. of those inoculated with the tissue culture vaccine did likewise. The blood of some of the staff of the hospital who had not been vaccinated was also tested and it was found that those who had been in close contact with typhus cases also gave a positive reaction and in about the same degree as the vaccinated staff. It was also found that if the blood of inoculated people was tested before and after inoculation a marked rise in the titre of the Weil-Felix reaction was demonstrated. D H

WANG (K H.) LIU (P Y) & ZIA (Samuel H) **Cultivation of Typhus Rickettsiae in Maltland Tissue Culture Medium using Mouse Embryo Tissue**—*Chinese Med J* 1940 Mar Supp 3 pp 368-373 [10 refs.]

Five strains of typhus Rickettsiae were cultivated in tissue culture medium using mouse embryo tissue instead of guinea pig tunica albuginea. The growth obtained was just as good as with guinea pig tissue and the organisms after being propagated in this medium for considerable periods were found to have retained their characteristic virulence for guinea pigs. The detail of the technique is described and it is similar to that of NIGG and LANDSTEINER except for the substitution of the mouse embryo tissue. D H

ITO (R.) & WOHLRAB (R.) **Ueber die Auswertung von Rickettsia mooseri Impfstoffen im Mäuseversuch. (Vergleichende Untersuchungen mit R. Impfstoffen verschiedener Herstellungsart)** [The Value of the Inoculation with *R. mooseri* as estimated by Research employing Mice. A Comparative Research with Various Other Rickettsial Injection Materials.]—*Ztschr f Hyg u Infektionskr* 1939 Oct. 21 Vol. 122. No 2 pp 220-226

The vaccines employed in these researches were prepared in 3 ways from intraperitoneal injection into irradiated mice from cultures on chick embryo membrane and from tissue cultures. These were emulsified and killed by addition of formalin.

The authors found that by employing the intraperitoneal route in mice more delicate protection tests could be carried out than when guinea pigs were utilized and the value of the various Rickettsial vaccines could be accurately determined. D H

FREEMAN (Mavis) DERRICK (E. H.) BROWN (H. E.) SMITH (D. J. W.) & JOHNSON (D. W.) Studies in the Epidemiology of Q Fever. 5. Surveys of Human and Animal Sera for *Rickettsia burnetii* Agglutinins.—*Australian Jl. Experim. Biol. & Med. Sci.* 1940 Sept. Vol. 18. Pt. 3. pp. 183-200. With 1 fig. [Summary appears also in *Bulletin of Hygiene*]

The agglutination test with *R. burnetii* is a useful means of determining the incidence of infection of man and animals by the virus of Q fever. Agglutinins are present in the serum for varying periods (up to several months) after an attack and even when the infection has been inapparent.

Infection of bandicoots (*Isodon macrourus*) has been noted (see this *Bulletin* 1940 Vol. 37 p. 563-851), but the number of such now examined totals 180 and of these 39 have proved positive, indicating that this animal may play an important rôle in the natural spread of the disease. The proportion positive was much higher among bandicoots captured at Cowan Cowan than those on the mainland. The former are highly infested with *Haemaphysalis humerosa*. Other animals tested were opossum (*Trichosurus vulpecula*), the rat kangaroo, the black and other rats and cattle from Brisbane and Nambour districts and Imbil. Three rat sera gave agglutination and that of a cow belonging to a farmer of the Nambour district who had recently passed through an attack of Q fever.

Four hundred and forty-eight human sera were also tested. 79 were from abattoir workers in Brisbane and 18 of them proved positive, as did 6 out of 64 forestry workers in Imbil. Among 186 militia at Cowan Cowan none reacted—evidence that *H. humerosa* does not readily feed on man. Negative results were also obtained with the sera of 99 aborigines and 20 patients with fever (other than Q fever). [See also *Bull. of Hyg.* 1938 Vol. 13 pp. 123-673 1939 Vol. 14 pp. 258-520 1940 Vol. 15 pp. 608-609 and this *Bulletin* 1940 Vol. 37 p. 563.]

H. H. S.

ANDERSON (W. M. E.) The Technique of Virus Culture on Chorio-Allantoic Membrane in Military Laboratories.—*Jl. Roy. Army Med. Corps* 1940 Oct. Vol. 73 No. 4 pp. 211-222. With 4 figs. [10 refs.] [Summary appears also in *Bulletin of Hygiene*]

WOODRUFF and GOODPASTURE first demonstrated in 1931 that viruses could be cultivated on the chorio-allantoic membrane of the developing chick embryo. Since that time the technique has been applied to a large number of viruses and has been modified and improved by various workers, especially BURDET. The present report gives a clear detailed account of the technique used at the District Laboratory Peshawar in work on sandfly fever. The practical points dealt with *seriatim* are—the maintenance of a supply of fertile eggs, a suitable incubator, a method of testing for egg fertility, inoculation of eggs, harvesting and grinding of membranes, a crude serum neutralization test, histology of lesions and non-specific lesions.

Thus although the report contains nothing new and makes no mention of any of the more recent developments of chick embryo virus culture work, it provides all the information necessary for the adoption of a proven technique in military laboratories. A list of essential equipment for the work is given in an appendix.

Wilson Smith

PATISO CAMARGO (Luis) Estado actual de la bartonellosis (fiebre verrucosa verruga) en el continente Americano [*Bartonellosis in America.*].—Reprinted from *Rev Facul de Med Bogota* 1940 Sept Vol 9 No 3 pp 161-173 With 5 figs. & 1 map

This article is largely concerned with the Colombian outbreak of bartonellosis in 1936-8 called verruca fever or Guáitara fever a subject which has been fully described in this *Bulletin* [1940 Vol. 37 pp 271 582-84]. The infection is more widespread than has been thought and exists in Colombia in Peru Ecuador and Guatemala. The author records experimental work—Injection of *Macaca* with cultures. Various species of *Phlebotomus* are abundant in the districts where Bartonellosis occurs but there is no proof that this is the vector [In previous publications the louse was suggested but this also is not yet confirmed.]

The disease is serious and has a fairly high fatality rate and consequently is a public health problem calling for investigation the suggestion is made that laboratories should be established for discovery of other at present unknown foci, for determining the vector of infection and what reservoirs of the virus there may be if any and to find out whether some method of vaccination against infection can be devised.

H H S

CHOLERA.

PRÉCIS OF ABSTRACTS IN THIS SECTION

CHATTERJI (p 210) shows that in 1938 there was a rise in cholera in Bengal, and that this appears to have been due to floods which were followed by an epidemic almost 5½ per cent. of provincial deaths were due to cholera. Among permanent anticholera measures improvement of rural water supplies takes a prominent place. BORCAR (p 211) reports on an outbreak near Goa which was controlled by isolation of the sick and of contacts and by vaccination and disinfection.

Utilizing their well-known tendency to grow as a film on the surface of peptone water WAKAMIYA (p 211) describes a diagnostic technique for the rapid isolation of cholera vibrios from faeces. WILSON and REILLY (p 211) describe a fluid bismuth-sulphite medium and a saccharose mannitol sulphite bismuth alcohol phenol-red agar medium which they found to allow rich growth of the true cholera vibrio and to inhibit the growth not only of *coli-aerogenes* organisms but also of many vibrios liable to be mistaken for the true *V. cholerae*.

VENKATARAMAN (p 212) states however that the mannose-bismuth sulphite method of enrichment used in the examination of specimens of water is not capable of yielding a differential isolation of *V. cholerae* since by this method non-agglutinating vibrios could be obtained from almost all tank and river waters examined. Agglutinable vibrios were found to survive at least 74 days in 2 per cent salt water. He reports that during epidemics in the Cauvery delta Madras the vibrios isolated have been of the Ogawa type but in periods of low incidence the Inaba type has been found.

FOURNIER (p. 212) has studied 1 130 strains of cholera vibrios of epidemic type isolated from stools in Shanghai in 1933. Serologically they belonged preponderantly to the intermediate Hikojima type, showing characters which have remained constant in Shanghai epidemics since 1921. This points to the endemicy of cholera in the Shanghai region. One-quarter of the vibrios possessed some degree of haemolytic power lost after 2 to 5 months on subculture, thus suggesting the presence of a haemolysin and of a neutralizing substance which latter makes its appearance rather later than the former in cultures.

By subjecting a typical cholera vibrio to the action of different combinations of cholera phage types VARDON (p. 213) has produced a number of variants of which he has studied the biochemical and serological reactions. His results suggest that the earlier findings of TOMB and MAITRA, that agglutinable cholera vibrios became non-agglutinable in tank waters, may have been due to the presence of bacteriophage in the water as a similar change is observable in his laboratory-produced variants. Vardon further concludes that phage-infected water vibrios may be assumed to be avirulent, but that if they are able to rid themselves completely of cholera phage infection they will revert to the parent phage-free cholera vibrio which is pathogenic.

In a study of the R and ρ agglutination reactions and agglutinating antigens of *V. cholerae* WHITE (p. 214) found that the major component in the somatic agglutination of these races of vibrios seems to be a heat-stable antigen, resistant to proteolytic digestion and possibly of protein nature. This component includes the polysaccharide haptene C8 or C8' and is possibly to be regarded as the R or ρ antigen proper. There is some reason to suspect that the R and ρ agglutinating antigens furnish the "skeletal system" of the vibrio. He (p. 214) describes a method of obtaining the flagellar fraction from chloroform-treated saline suspensions of R or ρ races of vibrios. The flagellar fraction obtained may be used for flagellar agglutination tests, for fixation of flagellar agglutinins, and for the production of pure flagellar agglutinating sera. He finds no evidence so far of the existence of a flagellar haptene. He (p. 214) also describes the extraction of a heat-stable somatic protein antigen (H.S.S.P.) of *V. cholerae* which is possibly associated with a haptene Cy2.

MAITRA (p. 215) records the successful use of cholera phage both as a curative and as a prophylactic agent, in the Province of Bihar.

R. L. S.

BENGAL PUBLIC HEALTH REPORT FOR YEAR 1938 [CHATTERJI (A. C.) Director] pp. 35-47. With 4 charts & 2 maps.—Cholera.

Cholera in Bengal showed a rise in 1938, a rather unexpected rise considering the extensive anticholera measures which had been put into force and the marked drop in cholera mortality of the previous year. The rise, however need not cause disappointment, as it seems due to the unforeseen occurrence of flood and the epidemic following it. In 1938 nearly 5½ per cent. of the total provincial deaths were due to cholera. Several graphs and maps exhibit clearly the position with regard to cholera for that year and for preceding years. It is satisfactory to note that among permanent anticholera measures that of improvement of rural water supplies takes a prominent place and that increased financial assistance is forthcoming for this purpose. The

urgency of provision of money is to be determined by the following criteria *viz* —(a) prevalence of cholera (b) shortage of drinking water (c) poorest localities to have preference and (d) other things being equal, preference will be given to localities offering substantial contributions in money or in labour

W F Harvey

BORCAR (Pondorinat A. S) *Epidemia de cólera em Gogolá de Din* [An Epidemic of Cholera in Gogola by Din.]—*Boletim Geral Med Nova Goa*. 1940 Apr–June Vol. 22, Nos. 4–6 pp 68–87

The town of Gogola is in a small Portuguese settlement on the southern extremity of the Kathiawar peninsula and at some distance by sea from the capital of Portuguese Goa. Its inhabitants are mainly fishing folk. Timely intimation of the near by occurrence of cholera cases enabled the governor to issue orders for a medical delegation to take steps to meet the menace. These instructions were carried out with vigour and were no doubt the reason why the outbreak did not assume serious proportions. Owing to the distance from the capital prophylactic vaccine was difficult to obtain at the beginning and vaccinations were confined in the first place to personnel who had to take many risks in carrying out their work. The deficiency was soon made good. Among the controlling measures taken were rapid isolation of the sick in hospital immediate evacuation of contact persons anticholera vaccination disinfection domiciliary inspection consultation with neighbouring medical authorities treatment of the sick. The population involved was over 7 000 and the total number of cases notified was 23 some of them only after death.

W F H

WAKAMIYA (Shazo) *Ueber Wucherungszustände und Agglutination der Cholerabazillen im Peptonwasser* [Growth Conditions and Agglutination of Cholera Bacilli in Peptone Water]—*Taiwan Igakkai Zasshi* (*Jl Med. Assoc. Formosa*) 1940 Sept. Vol. 39 No 9 [In Japanese pp 1488–1491 German summary p 1492]

In these trials the well known tendency of cholera bacilli to grow as a veil on the surface of peptone water is utilized for rapid diagnosis. Faeces were added to peptone water and from the surface layer of growth transfer was made to 1–200 diluted serum by platinum loop. This was incubated. Cholera vibrios were easy to isolate. The agglutination of the vibrios was also evident. Diagnosis could be carried through in 4 to 5 hours. The reason for this early isolation is furnished by a comparison of growth conditions of *Bact coli* and *V cholerae* respectively in peptone water using colour change in the indicator as evidence for commencing activity. Whereas *V cholerae* was already active in one hour it took some 3 hours for *Bact coli* to emerge from a latent growth condition.

W F H

WILSON (W James) & REILLY (L. V) *Bismuth Sulphite Media for the Isolation of V cholerae*—*Jl Hygiene* 1940 Sept Vol. 40 No 5 pp 532–537

The media introduced originally by WILSON and BLAIR and adopted with modification for the differential isolation of *V cholerae* from stools and water by READ [this *Bulletin* 1939 Vol. 36 p 894] and SEAL [this *Bulletin* 1940 Vol. 37 p 278] is further modified by the authors. The media are prepared as follows —

Fluid medium. (1) Prepare anhydrous sod. sulphite 20 gm. boiling water 100 cc (2) Add bismuth ammonio-citrate scales 0.1 gm. water 10 cc (3) Boil (4) Prepare glucose, saccharose, mannitol or mannose solutions 20 gm in 100 cc boiling water (5) Mix, when cool, the selected sugar solution and the mixture, which will have pH 9.4 (6) Keep this mixture as stock. (7) Add, just before use, 10 cc of sugar-sulphite-bismuth mixture to 100 cc peptone water of composition: peptone 1, sod chloride 2, water 100 made to pH 9.1 by sod carbonate solution (sod carbonate 53, water 400) and 1 cc. absolute alcohol.

Solid medium. (1) Prepare (a) 100 gm anhydrous sod sulphite in 500 cc boiling distilled water (b) 30 gm. bismuth ammonio-citrate scales in 250 cc boiling water (c) saccharose 50 gm., mannitol 5 gm., water 250 cc (2) Mix (a) and (b) and boil 2 minutes (3) Cool and add (c) (4) Add 15 gm. sod bicarbonate dissolved in 50 cc. cold water to the mixture (5) Keep as stock mixture (6) Prepare peptone-agar of composition—peptone 40 gm. sod chloride 80 gm., water 4 000 cc., sod carbonate solution (53 gm. 400 cc water) 40 cc. autoclave and adjust without filtration to pH 8.6 (7) Add to 100 cc. of this alkaline peptone agar melted and cooled to 50°C. 20 cc stock mannitol-saccharose-sulphite-bismuth mixture, 2 cc. 1/1000 phenol red and 2 cc absolute alcohol. (8) Pour plates (9) Sow test material.

The media have been found useful for the suppression of *coli-aerogenes* organisms, isolation of organisms of the typho-dysentery group, distinctive characterization of *Proteus* and *Str. faecalis* organisms and the promotion of a rich growth of true cholera vibrios, often in sharp contrast with that of El Tor cholera-like and paracholera strains.

W F H

GUINDY REPORT OF THE KING INSTITUTE FOR YEAR ENDING 30TH SEPT 1939 pp. 32-34.—Cholera (Field) Enquiry [VENKATARAMAN (K. V)] under the Director King Institute Guindy

In 1936 and 1937 during a time of epidemic prevalence all the cholera vibrios isolated were of Ogawa type. Then in 1938 came a year of low incidence, sporadic cases and limited outbreaks with change to the Inaba type of vibrio. Now once more in 1939 as was predicted for an epidemic year. It has been found that all of the 30 cultures of vibrio isolated were of the Ogawa type. In examination of water supplies for vibrios at the Institute the mannose-bismuth-sulphite method of enrichment was adopted. Only on one occasion was the agglutinating vibrio isolated but non agglutinating mannose-fermenting vibrios could be obtained from "practically every tank and river water examined. The mannose-bismuth-sulphite method of enrichment adopted is not capable of yielding a differential isolation of *V. cholerae* under these circumstances."

Some experiments were carried out to determine the period of survival of agglutinable vibrios in salt water and it was found that in a 2 per cent. concentration they could still be recovered up to at least 74 days.

W F H

FOURNIER (J.). Sur quelques caractères de vibrios cholériques isolés à Shanghai en temps d'épidémie. [Characters of Vibrios Isolated at Shanghai in Time of Epidemic. —*Chinese Med. J.* 1940. Mar Supp. 3. pp. 431-438. [18 refs.]

A large number of strains of cholera vibrios were isolated from stools in Shanghai in 1938. These were subjected to some immediate tests,

which are highly important for the proper classification of vibrios the vibrios were essentially vibrios of epidemic type. The total number of strains was 1 130 and they all possessed certain definite characters on isolation. They were cocco-bacilli only produced a pellicle slowly on liquid media and belonged preponderatingly by serological test to the intermediate Hikojima vibrio type. These are characters which have remained constant in epidemics at least since 1921 and they point to the endemicity of cholera in the Shanghai region. All the agglutinable vibrios isolated belonged to Heiberg's group I (mannose + saccharose + arabinose 0) and those that were non-agglutinable could only be divided into groups I and II. With subculture however and the appearance of rough colonies all the different groups of Heiberg made their appearance. The Voges-Proskauer reaction was consistently negative in the agglutinable vibrios. Serological characters of these 1 130 strains (679 agglutinable and 451 non-agglutinable) have already been recorded [this *Bulletin* 1939 Vol. 36 p. 895]. Haemolytic power which is so important for the classification of cholera vibrios was tested in all the 1 130 strains by adding 10 drops of 5 per cent suspension of sheep erythrocytes to 2 cc. vibrio suspension. It was found that about one-quarter of the vibrios isolated possessed some degree of haemolytic power. This power appears to be lost after 3 to 5 months with subculture of the agglutinable strains. Such haemolytic power as may be possessed by cholera vibrios seems to be rather restricted and indeed to be present for a short time only. Thus 20 freshly isolated vibrio strains of which 10 were haemolytic and 10 non-haemolytic exhibited a haemolytic phase period of variable intensity and duration which manifested itself between the 6th and 12th hours of cultivation. These 20 strains were isolated in full epidemic were agglutinable by Hikojima O serum belonged to Heiberg group I gave a negative Voges-Proskauer and a positive cholera red reaction that is to say were true cholera vibrios. This haemolytic phase phenomenon is shown in all the subcultures apparently quite apart from the passing haemolytic reaction which may be given by some cholera vibrios at the time of isolation. It is explained by the possession by the cholera vibrio of a haemolysin and a neutralizing substance which latter makes its appearance rather later than the former in cultures.

W F H -

VARDON (A. C.) *Vibrio cholerae* and Other Vibrios (Observations on 'Water Vibrios, with Special Reference to their Variation during Storage in Culture Medium and Possible Relationship to *Vibrio cholerae*')—*Indian Med Gaz* 1940 Sept. Vol. 75 No. 9 pp. 522-527 [10 refs.]

It will be remembered that TOMB and MAITRA [this *Bulletin* 1927 Vol. 24 p. 460] came to the conclusion in 1928 that agglutinable cholera vibrios became non-agglutinable in tank waters became in fact water vibrios. [AHUJA however failed to convert agglutinable into inagglutinable vibrios and regarded the evidence of such change in his experiments as unconvincing. This *Bulletin* 1939 Vol. 36 p. 897.] The author has endeavoured to bring about the same result by subjecting a typical cholera vibrio to the action of different combinations of cholera phage types. A number of variants were thus obtained and both HO and O sera prepared to them. His experimentation has led him to conclude that Tomb and Mastra's

findings were due to the presence of cholera bacteriophage in the tank waters which resulted in the cholera vibrios becoming non-agglutinable, similar to the variants produced in the laboratory." A further important conclusion is that phage-infected water vibrios may be assumed to be avirulent, but if they are able to rid themselves completely of cholera phage infection they will revert to the parent phage-free cholera vibrio which is pathogenic.

W F H

WHITE (P Bruce) A Method of obtaining the Flagellar Fraction of Vibrios.—*Jl Path & Bact* 1940 Nov Vol 51 No 3 pp 446-447 With 5 figs on 1 plate.

It is advisable in this method to use R or ρ races of vibrio so as to exclude the smooth specific antigen of an S race in preparing flagellar antigen. Flagella are obtained by mixing chloroform with a dense suspension of vibrios which then becomes slimy and enables flagella to be torn from the bacteria by stirring. Centrifugalization, treatment with saturated ammonium sulphate and washing yield a suspension of flagella which may be used for agglutination, for fixation of flagellar agglutinins and for the production of pure flagellar agglutinating sera. The suspensions give an intense buret, an imperfect Milon and a weak Molsch reaction.

No evidence has been obtained of the existence of a flagellar hapten nor yet of any serological reaction of flagellar substance in solution. So far all the observed reactions appear to be in the nature of an agglutination of formed flagella."

W F H

WHITE (P Bruce) The R and ρ Agglutination Reactions and Agglutinating Antigens of *V. cholerae*.—*Jl Path & Bact* 1940 Nov Vol 51 No 3 pp 447-449

The S and R culture forms of organisms are well known. The ρ type is the most degraded of all cholera variants and "the polysaccharide substances contained by this form are common in whole or in part to many vibrios [this *Bulletin* 1938 Vol 33 p 861]. This communication, preliminary to completion of a study of the antigens of R and ρ *V. cholerae* is summarized by the author —

"It would seem that the major component in the somatic agglutination of R and ρ vibrios is a heat-stable antigen which, though it perhaps contains protein, is at least considerably resistant to proteolytic digestion. This component includes the polysaccharide hapten C β or C δ . It is possibly to be regarded as the R or ρ antigen proper. But the somatic agglutinating apparatus of the variants seems to present other antigenic components. Since they appear to be totally inactivated by proteolytic enzymes they are probably of protein nature. Possibly they are combined with the proteolysis-resistant component in a single complex. There is some reason to suspect that the R and ρ agglutinating antigens furnish the skeletal system of the vibrio."

W F H

WHITE (P Bruce) A Heat-Stable Somatic Protein Antigen (H.S.S.P) of *V. cholerae*.—*Jl Path & Bact* 1940 Nov Vol 51 No 3. pp 449-451

The extraction of a heat-stable somatic protein antigen (H.S.S.P) is now described, in which R and ρ cultures of *V. cholerae* were used to avoid complication introduced by smooth specific S antigen.

Moreover the originally described Cy hapten is subdivided into Cy1 and Cy2, of which the latter is present in the fraction H.S.S.P. According to the author's summary the fractions which have now been separated from the vibrio bodies are —(1) A heat-labile somatic protein antigen (H.L.S.P.) referred to in a previous abstract [this *Bulletin* 1940 Vol. 37 p 720] (2) A heat-stable somatic protein antigen (H.S.S.P.) possibly associated with a hapten Cy2 (3) An alcohol soluble Q protein fraction [this *Bulletin* 1936 Vol. 33 p 374] (4) The differential agglutinating S R and ρ antigens with their respective polysaccharide haptens Ca, Cβ and Cδ [this *Bulletin* 1936 Vol. 33 p 861] Another hapten, Cy1 is probably also of somatic origin while yet another the rucose hapten [this *Bulletin* 1940 Vol. 37 p 719] has been derived from the intercellular secretion of rucose cultures. A method has been given for separating the vibrio flagella [see above] Antibodies for all these components occur or may occur in the sera of rabbits immunized with living cultures of *V. cholerae*.
W F H

BIHAR PROVINCE OF ANNUAL PUBLIC HEALTH REPORT YEAR 1938 & ANNUAL VACCINATION REPORT YEAR 1938-39 [MITRA (S L) Director] [Cholera p 31]

Field Work on Cholerae—The use of cholerae was introduced in this province nine years ago. The results of its use both as a curative agent as well as a prophylactic agent appeared to be highly encouraging and since then its use has been extended to the province in an increasing degree. It is now definitely found that its use as a curative agent gives the best results even in the rural areas when used in early stages of the attack, but when dehydration has taken place and collapse has set in its use needs supplementing with transfusion of saline. As a prophylactic agent it invariably cuts short the epidemics provided immediate steps are taken to phage the total population exposed to the infection.

MERTENS (W K.) & BEEUWKE (H.) Haemolysis Experiments with Cholera, El Tor and Celebes Vibrios.—*Meded Dienst d Volksgezondheid in Nederl Indië* 1940 Vol. 29 No 1/2. pp 10-26 [11 refs.]

This is an English version of the paper abstracted in this *Bulletin* 1940 Vol. 37 p 721

LEPROSY

PRÉCIS OF ABSTRACTS IN THIS SECTION

BUKER (p 217) found a leprosy incidence of 6.1 per cent in 128 villages in Kengtung, but whereas in the Shan villages the incidence was 3.6 in the Lahu villages it was as high as 14.2 per cent. These figures are higher than those previously found and the increase is attributed to famine conditions.

DHARMENDRA and LOWE (p 217) have not been able to confirm the work of ADLER and of SERGENT on the infection of Syrian hamsters with human leprosy. In 23 animals no generalized or progressive

[April, 1941]

Infection was found, but since bacilli were present in the implanted nodules for many weeks the authors cannot exclude the possibility of multiplication at the site of implantation. From some of the animals the spleens were removed before the implantation or intra peritoneal injection of the leptotic material. ARAJO (p 218) however reports successful infection of *Cricetus cricetus* with material from human lepromata. bacilli were found in the blood, liver, spleen, kidneys and axillary glands four weeks after the inoculation.

ITAKURA (p 218) found microscopic (but not macroscopical) leprosy lesions in the gums and the dental pulp of lepers.

BLANCHER and FERNÁNDEZ (p 219) describe the histological changes in tuberculous leprosy in the stage of reaction, either spontaneous or induced by the injection of lepromun. Epithelioid cells are found, with subsequent necrosis and fibroid changes, but there are few bacilli. Tuberculous leprosy is the result of hypersensitization, and there is a high degree of immunity. COLASCO (p 220) found tuberculous changes at the site of lepromun injections in 4 of 5 patients who showed strong reactions in 3 of 16 with weak reactions and in none of 18 who failed to react. In the strongly reacting cases suppuration took place.

OSERDOERFFER and COLLIER (p 220) report that in tuberculous leprosy atrophy of bone is shown by X-ray to be most frequently damaged by the which are supplied by the nerves most frequently damaged by the disease. In lepromatous disease the atrophy is most marked in the distal phalanges. The disturbances of nutrition which cause these changes are probably due to the inactivation of muscles and the authors therefore advise the purposive training of the muscles concerned.

RODRIGUES and WADE (p 220) report a case of tuberculous leprosy in which bullae appeared leading to ulceration. The same authors (p 221) describe three cases intermediate between tuberculous and lepromatous disease.

ARAJO (p 221) found the first leprotic lesions to be maculae in 38.7 per cent and dysaesthesiae in 27.2 per cent of 975 cases (mostly children) studied in Rio de Janeiro. STREX (p 221) describes a follicular condition of the skin consisting of specific granulomata, with lepra cells and bacilli, which destroy the hair follicles and which may form the starting points for lepromata. The condition is relatively common. LOWE and CHATTERJI (p 222) report three cases which commenced with the neural form of leprosy but in which lepromatous lesions rapidly developed.

ANKER (p 222) reports a marked increase in lepra reactions which occurred shortly after the vaccination against smallpox of the inmates of a leper home. All the reactions, some of which were severe occurred in vaccinated persons.

The Committee on Leprosy Skin Tests (p 222) reports failure with antigens from leprosy spleens to obtain skin reactions of any value in diagnosis. Extracts of normal spleens gave approximately similar results. HENDERSON (p 222) also records failure along these lines.

HOFFMANN (p 223) issues a warning against diagnosing leprosy on the finding of acid-fast bacilli in nasal mucus or in ulcers, with supporting clinical findings. These bacilli may be saprophytes from water or soil and may have no pathological significance. They may always be morphologically distinguishable from leprosy bacilli.

In discussing the basic principles of treatment, MURK (p 223) stresses the importance of strengthening and stimulating the tissues

by improving the general health to act more vigorously against the bacilli. Drug treatments are also discussed. He (p 223) writes on the treatment of the nasal condition in leprosy. Saline irrigations (with ephedrine if there is much catarrh) are advised, and for lepromata cauterization with 10 per cent trichloroacetic acid after local anaesthesia.

ABAUJO (p 224) gives an account of the leprosy preventoria in Colombia.

SARDJITO (p 224) describes the process of immunization of sheep with the Siddik strain of acid fast bacilli.

NONAKA (p 224) states that human or rat leprosy material injected into chickens produces leprosy changes locally and sometimes in the internal organs which are more extensive than when the same material has been heated before injection. Rat leprosy bacilli however soon lose their infectivity in chickens. KUDICKE (p 225) has studied the action of a number of esters of chaulmoogric and hydnocarpic acids on rat leprosy. At best only retardation of the lesions was obtained, but the drugs deserve further study. C IV

BUKER (Richard S) *Leprosy in Kengtung, Southern Shan States, Burma. Report of the Survey in 1939-40—Leprosy in India* 1940 July Vol. 12. No 3 pp 78-82.

Kengtung has a population of about 300 000 half of whom are Shans. A leprosy survey in 1939-40 of 128 villages revealed an incidence of 6.1 per cent. 609 cases among slightly less than 10 000 examined. The Shan villages showed a rate of 3.6 per cent the Lahu villages the high incidence of 14.2 per cent and one Chinese village revealed no cases. Among the Shans 37.6 per cent. of the cases were of the lepromatous type. These figures show an increase on previous ones and this is attributed to famine conditions. There was noted an inverse relationship between the numbers suffering from enlarged spleen in this malarious area and those afflicted with leprosy. Colocasia is eaten to some extent by the people but it was not possible to say which of the tribes eat most. Leprosy here is considered to be a very serious and increasingly great health problem but the State now has ten leper colonies accommodating a total of 1 100 patients on a voluntary basis.

L. Rogers

DHARMENDRA & LOWE (J) *Attempts at Transmission of Human Leprosy to Syrian Hamsters.—Indian J Med Res* 1940 July Vol 28 No 1 pp 61-69

The authors report on attempts to infect 23 Syrian hamsters some previously splenectomized by intraperitoneal injection or subcutaneous transplantation of a human leprosy nodule. Two of the animals died in three weeks two lived eight months and the rest were killed between the ninth and twelfth months. In only two of the whole number were slight microscopical lesions and bacilli found elsewhere than in the nodule at the site of injection in the form of slight enlargement and congestion of the local lymph nodules in two of the six animals dying early within three weeks. In two other animals a few bacilli without visible lesions were found respectively in an inguinal gland and in the omentum. It is therefore concluded that although the bacilli can persist in the implanted nodule for long periods and the possibility of their multiplication therein cannot be excluded, the inoculation of the bacilli by either method used has not

been followed by a generalized or progressive infection. The authors are thus not able to confirm the reports of ADLER and of BURGER that the Syrian hamster is susceptible to human leprosy. [See this Bulletin 1938 Vol 35 p. 293 1939 Vol 38 pp. 240 539] L. R.

ARAUJO (H. C. de Souza) Inoculação positiva da lepra humana no hamster (*Cricetus cricetus*) com bacillemia. [Successful inoculation of *Cricetus cricetus* with Human Leprosy]—*Brasil Medico* 1940 Apr 8 Vol 54 No. 14 pp. 249-252. With 2 figs.

The author records that in September 1939 he received ten adult hamsters *C. cricetus*, from Dr. Evandro Chagas. Five he inoculated with 2 cc. of an emulsion from a human leproma, intrapentoneally and subcutaneously in the right axilla. One died on the 37th day afterwards but nothing abnormal was observed at autopsy. On the 75th day the other four were re-inoculated with 2 cc. of an emulsion of another leproma subcutaneously in the right axilla. Four weeks later one of them showed an ulcer at the angle of the mouth and was emaciated and a few days later became paraplegic. Blood was taken from the heart before it was killed, and smears showed numerous lepra bacilli, in small groups. Examination was made also for the kidneys and the axillary glands. Presence of some virus but no indication of other hamsters inoculated are still under observation.

Five more were similarly inoculated with 2 cc. of emulsion of liver and spleen of a rat infected with Stéfanovsky's bacillus (murine leprosy). One escaped, a second died on the 83th day but nothing abnormal was detected, except that small numbers of the organisms were seen in smears from the testicles and spleen some of the bacilli were seen, but none in the other viscera. The remaining two were killed on the 129th day they were well nourished and showed no skin lesions. In one there were a few bacilli in the axillary glands, lungs, spleen and kidneys thus in three of the four examined bacilli in small numbers were found. [See also this Bulletin 1938 Vol 35 p. 293 1939 Vol 36 p. 539 1940 Vol 37 pp. 331 827] H. H. S.

ITAKURA (Teiju) The Histo-Pathological Studies on the Teeth of the Lepers, especially on its Pulp-Tissue.—*Acta Japonica Med. Trop. Formosa* 1940 Mar Vol. 2 No. 1 pp. 105-168. With 14 figs. (2 coloured) [24 refs.]

— The Histo-Pathological Studies on the Teeth of the Lepers, especially on Gingiva and Other Supporting Tissues of the Teeth.—*Tenryo Igakkai Zasshi (J. Med. Assoc. Formosa)* 1940 Aug Vol 39 No 8 [In Japanese pp. 1214-1237] With 2 figs. & 2 plates. English summary pp. 1237-1239.]

These papers record the results of three years of study of the histology and pathology of the teeth in leprosy. In the case of the gums no macroscopical lesions were noted, but macroscopically typical lepro lesions were observed in the mucous membrane in 66.67 per cent. lepromatous and in 12.28 per cent. of nerve cases, and in 38.69 of whole *Myco leprae* were found, most frequently in the lepromatous

type In the dental pulp typical leprous affections were found in 32.58 per cent. including teeth presenting no abnormal naked eye appearances. The lesions were most frequent in lepromatous cases and in the frontal group of teeth especially the central incisors. Coloured teeth were not especially frequently involved. The pericementum was diseased in as many as 50 per cent. most often in lepromatous cases. The dental alveoli especially the medulla were involved in 50.85 per cent. including 61.36 per cent. of lepromatous but only 2 per cent. of the neural type. It was mostly slight or medium in extent with no special incidence. L. R.

BÜNGELER (W.) & FERNÁNDEZ (J. M.) Untersuchungen ueber den klinischen Verlauf und die histologischen Veränderungen allergischer Reaktionen bei der Lepra [*Researches on the Allergic Reactions in Leprosy*] I Mitteilung Klinische und histologische Untersuchungen ueber die Leprolinreaktion nach Mitsuda.—*Virchows Arch f Path Anat u Physiol* 1939 Nov 16 Vol. 305 No 1 pp 236–260 II Mitteilung Klinische und histologische Untersuchungen ueber die spontane Reaktion der tuberkuliden Lepra.—*Ibid* Dec 27 No 2, pp 473–493 With 19 figs. III Mitteilung Klinische und histologische Untersuchungen ueber die Künstliche Aktivierung der tuberkuliden Lepra.—*Ibid* 1940 Feb 2 No 3 pp 593–608 With 12 figs. [Numerous refs.]

The first part of this comprehensive article is an amplification with additional illustrations of a paper of Fernández already reviewed [See this *Bulletin* 1940 Vol. 37 p 632.]

Part II deals with clinical and histological researches on spontaneous reactions in tuberculoid leprosy which is very mild in comparison with the lepromatous form and is characterised by the presence of epithelioid cells and very few bacilli. Two hundred cases were studied in all stages of reaction. A recent reaction in an old lesion shows congestion and marked oedema especially of the papillary layer of the skin together with small-celled infiltration around the blood vessels and the hair follicles followed by connective tissue degeneration and necrosis. The old foci are usually free from lepra bacilli which are destroyed owing to the high degree of immunity in tuberculoid cases.

Part III deals with the clinical and histological appearances met with in the case of artificially induced reactions in tuberculoid leprosy. it contains a number of illustrations. Subcutaneous injections of standardized lepromin were used for inducing the reactions which were followed locally within 24 hours by swelling and roseolar eruptions and surrounding hyperaemia accompanied by local heat and a burning sensation. After two to three weeks the typical late reaction shows local swelling which may result in discharge of pus leaving a pigmented scar after a month.

The histological changes are very similar to those described in Part II above beginning with oedema and round-celled infiltration especially around the hair follicles and sebaceous glands and distinct mobilization of the histiocytes and epithelioid cells with vacuolation and followed by connective tissue degeneration as a rule with absence of lepra bacilli. Later necrosis and ultimately fibroid changes result. The authors conclude that tuberculoid leprosy is essentially a state of permanent hypersensitization with a high degree of immunity against leprosy infection. L. R.

BUNGELER (W) Die allergischen Reaktionen bei tuberkulöser Lepra. [Allergic Reactions in Tuberculous Leprosy]—*Klin Woch* 1940 Mar 30 Vol. 19 No. 13 pp 299-302.

The author discusses this question in the light of the literature and of microscopic examinations he has carried out with very similar results to those recorded in recent papers from the Philippines. The latter are not referred to presumably because they have not yet reached Germany. [See this *Bulletin* 1940 Vol 37 p 631] L. R.

NOLASCO (J O) The Lepromin Test in Lepra Reaction. II. Histology of the Reaction Lesions and Persistence of the Injected Bacilli.—*Internat J Leprosy* Manila 1940 July-Sept. Vol. 8. No 3 pp 285-298 With 10 figs on 3 plates. [13 refs]

The author reports on the histology of the sites of lepromin tests in 35 lepromatous cases (lepers in the state of lepra reaction) and six non-reaction control cases (lepers not in the state of reaction) the area being removed from 21 to 49 days after the test injections. Of five cases giving two-plus reactions, four showed histological tuberculous changes, but only three of sixteen one-plus reactions and none of eighteen non reacting cases showed such changes. The injected bacilli were found in large numbers in 28 of 34 negative and one-plus cases and in large or fairly large numbers in two-plus reactions. In two-plus reactions suppuration occurred with numerous bacilli in the pus, but few in the surrounding tuberculous tissue. L. R.

OBERDOERFFER (M. J.) & COLLIER (D. R.) Roentgenological Observations in Leprosy.—*Amer J Roentgenology & Radium Therapy* 1940 Sept Vol. 44 No. 3 pp 396-395. With 15 figs.

The authors report and illustrate their observations on the X-ray appearances in a number of leprosy cases divided into nerve (tuberculous) and lepromatous types. In tuberculous leprosy they found the bone atrophy most marked in those bones the muscular insertions of which are supplied by the nerves most frequently damaged by the disease, namely the ulnar median at the wrist, peroneal and the posterior tibial at the ankle. In lepromatous cases the atrophy is earliest and most extensive in the distal phalanges. They assume that the disturbances of nutrition which cause these changes are due to the inactivations of muscles inserted into the bones concerned as the result of nerve destruction. They therefore advise the purposive training of the muscles concerned as likely to prevent these end results and they support the orthopaedic recommendations of Dow. The differences in the bone changes in the two types are of some diagnostic value. The essential change in the bones of mutilated hands and feet is atrophy of the ivory and cancellous tissues in various degrees.

L. R.

RODRIGUEZ (J N) & WADK (H. W.) Bullous Tuberculous Leprosy Report of a Case, with a Discussion of Laxerine Leprosy.—*Internat J Leprosy* Manila 1940 July-Sept. Vol. 8. No 3 pp 333-344 With 4 figs on 1 plate. [12 refs]

This is an illustrated account of a positive tuberculous case in which there suddenly appeared numerous bullae followed by ulceration leading to the formation of a mixture of pigmented, achromic and spotted scars such as old writers called laxerine leprosy. L. R.

WADE (H W) & RODRIGUEZ (J N) **Borderline Tuberculoid Leprosy**
—*Internat J Leprosy* Manila, 1940 July-Sept Vol 8
No 3 pp 307-331 With 19 figs on 5 plates [19 refs.]

The authors discuss the question of the transformation of tuberculoid leprosy into the lepromatous type in the light of three cases which they describe in detail. They were characterized by repeated mild reactions which yielded numerous leprosy bacilli when in the acute stage. Histologically they were intermediate between the two forms but they have not become lepromatous although their prognosis remains uncertain. They may easily be mistaken for the lepromatous form when the bacilli become numerous in them. L R

IGNACIO CHALA (J) **Sobre um caso de lepra tuberculoide** [A Case of Tuberculoid Leprosy]—Reprinted from *Rev Facul de Med Bogotá* 1940 Sept Vol 9 No 3 pp 121-136 With 11 figs. [21 refs.]

ABAUJO (H C. de Souza) **A lepra infantil na Colombia. Séde e tipos das lesões iniciais** [Leprosy in Children in Colombia Site and Type of Initial Lesions].—*Brasil Medico* 1940 Mar 9 Vol 54 No 10 pp 145-151 With 4 figs. & 4 graphs [15 refs.]

The author has recently examined 852 children at the Leprosarium de Agua de Dios who were believed to be free from leprosy. Of the total 413 were boys and 439 were girls. It has long been held that the earliest sign of leprosy is a macula—some colour change of the skin—and next to this some alteration of sensation. Among 975 cases studied by the author in a Rio de Janeiro leprosarium, maculae were the first lesions in 38.7 per cent, dysaesthesiae in 27.2 per cent. To determine the site of the initial lesion the author gives details of twenty cases in children ranging in age from 3 to 13½ years. In one the first noticed lesion was a sarcoid of Boeck situated in the right iliac region in a female child of 2½ years. In the others there were maculae of very varied distribution—face, arm, leg, buttock, thigh depicted or indicated in a series of line drawings. Nothing definite can be inferred from these but it may be said that speaking generally they indicate larger and perhaps more numerous lesions on the lower limbs [see also this *Bulletin* 1939 Vol 36 p 533] H H S

STEIN (A A) **Specific Affections of the Follicular Apparatus of the Skin in Leprosy**—*Internat J Leprosy* Manila, 1940 July-Sept Vol 8, No 3 pp 299-306 With 5 figs. on 2 plates

The author describes a peculiar affection of the follicular structure of the skin which he does not think has been previously noted although he met with it in no less than 33 per cent of his cases. It manifests itself clinically as yellowish brown somewhat sunken follicular spots with atrophic epithelium. Histologically specific granulomata with lepra cells and bacilli are found which rapidly destroy the hair follicles and the hairs. These lesions may form starting points for the formation of lepromatous granulomata and are seen principally on the lower extremities. L R

[April, 1941]

LOWE (J) & CHATTERJI (S. N.) Onset of Leprosy with Localised Lesions rapidly becoming Lepromatous.—*Leprosy in India*. 1940 July Vol. 12 No. 3 pp. 112-114 With 3 figs. on 1 plate.

Three cases are recorded which commenced with the neural type of the disease with erythematous patches, together with anaesthesia and thickening of nerves but in which, within a short time, lepromatous lesions containing numerous lepra bacilli developed. In the authors' experience a considerable number of cases either start in a lepromatous form or else develop into that form in a very short time. The cases are illustrated by photographs. L. R.

ARCHER G. B. A Brief Note on the Effect of Vaccination for Small-Pox on Leprosy.—*Leprosy in India* 1940. July Vol. 12 No. 3 p. 112.

The author reports an instance of the well-known leprosy reactions following vaccination against smallpox of the 900 inmates of the Porulia Leper Home in India in consequence of a patient who had been on leave developing the infection. In the fortnight before the vaccinations eleven cases of lepra reaction had been observed, about the average number. In the fortnight after 41 reactions of a more severe type than usual were noted, all in patients in whom the vaccination had taken successfully. L. R.

1. INTERNATIONAL JOURNAL OF LEPROSY 1940 July-Sept. Vol. 8 No. 3 pp. 283-289.—Skin Reaction Tests with Tuberculo-Type Extracts of Leprous Spleens. By the Joint Committee on Leprosy Skin Tests Philippine Bureau of Health and the Leonard Wood Memorial.

11. HENDERSON (Howard J.) An Attempt to obtain Specific Protein Antigens from Leprous Spleens.—*Internat J Leprosy* Manila. 1940. July-Sept. Vol. 8 No. 3 pp. 271-283 13 refs.]

These papers record negative results from carefully carried out experiments which should be brought to the notice of other workers.

1. The Committee have continued their attempts to find a test for leprosy comparable with the tuberculin test in tuberculosis in the absence of cultures of the leprosy bacillus. For this purpose they made three solutions of antigens made from the spleens of fatal leprosy cases but most of the reactions to their injection subsided within twenty-four hours, and the comparatively few positive reactions occurred in the contact group. Further the reactions to normal spleen extracts were usually about as marked as to those derived from leprosy spleens. In no case were late lepromin-like reactions met with at the end of two weeks. They conclude that the extracts of leprosy spleens tested did not contain substances that produce specific reactions in persons infected with leprosy.

11. This paper reports tests with the spleen antigens prepared on similar lines from spleens rich in leprosy bacilli, also with negative results. Those interested should refer to the original papers for details of the preparation of the antigens used. L. R.

HOFFMAN (W. H.) On the Limits of the Bacteriological Diagnosis of Leprosy.—*J Trop Med & Hyg* 1940 Sept. 16 & Oct. 1 Vol. 43 Nos. 18 & 19 pp. 234-236 243-245

This experienced observer stresses the difficulty in diagnosing leprosy with certainty from the mere finding of acid-fast bacilli, owing

to the frequency with which non pathogenic acid fast bacilli originating in the soil or water may gain access to the human system and be present in the nasal or urinary secretions as well as in the mouth. These may sometimes have a similar morphology to the bacillus of leprosy but in other cases can be distinguished from leprosy bacilli by their morphology or by being easily cultivated on ordinary media. He narrates cases with gangrenous limbs which were admitted to a leper hospital on account of the presence in the ulcers of acid fast bacilli differing in their morphology from those of leprosy and which he thought might have been saved by amputation. He could, however get no surgeon to undertake the necessary operation because the patients had been in a leper hospital. He quotes in confirmation of his own work observations of Dr A RECIO who found saprophytic acid fast bacilli in the saliva of 40 consecutive healthy persons by centrifuging and staining by the Ziehl-Neelsen method often confirmed by positive cultural methods in milk or on solid media. Leprosy should not therefore be diagnosed in the absence of clinical symptoms merely on the strength of finding acid fast bacilli in ulcers or in human secretions. L R

MUIR (E.) Some Basic Principles in Leprosy Treatment.—*Leprosy Review* 1940 Oct Vol. 11 No 4 pp 162-169

After emphasizing the high resistance of the tissues with intense cellular reaction in nerve cases, compared with the absence of resistance in the lepromatous type the author states that in the latter type the two objectives are to strengthen and stimulate the tissue cells to act more vigorously in breaking down the defence of the bacilli. These principles are the basis of his oft recommended measures to improve the general health by regular exercise, etc. Local applications of caustics, such as trichloroacetic acid intradermal injections of hydrotocarpus oil, the exact action of which is not fully understood, and nutritious diet are also advised. Potassium iodide in small doses at first is stated to have a specific effect in breaking down the defence mechanism of the bacilli. Fluoresceine in 10 gram doses daily for seven months methylene blue 4 grams for six months or trypan blue 4 grams for over one month are also recommended but he does not advise massive doses of these dyes L R

MUIR (E.) Intranasal Treatment in Leprosy —*Leprosy Review* 1940 Oct Vol 11 No 4 pp 173-175

The author advises (1) mild antiseptic treatment on the lines recommended by PARKINSON namely irrigation of the nasal cavities with normal saline with the aid of a pipette while the patient lies sideways on a couch. If there is much nasal catarrh 0.9 per cent. ephedrine hydrochloride should be added to the saline. (2) If there is severe sepsis with pus and crusts the same treatment is advised with longer retention of the saline to soften the crusts or sodium sulphate may be used up to 10 per cent strength (3) For dealing with leproma cauterization with trichloroacetic solution is advised in a 10 per cent. solution after the mucous membrane has been anaesthetized with a spray of 2 per cent novocaine and repeated after two weeks. Treatment diminishes the discharge of lepra bacilli from the nose L R

ARAUJO (H. C. de Souza) Os preventorios anti-leproso da Colombia.
[Leprosy Preventoria in Colombia.]—*Brasil Medico* 1940
Mar 18 Vol 54 No 11 pp 173-177

The first part of this article is of historical interest. A lazaretto was established at Laño de Loro in 1795 with patients transferred from Cartagena another lazaretto de Contratación was founded in Santander in 1881 and that of Agua de Dios in the Department of Cundinamarca in 1870. In these are housed 8,200 lepers. A census in July 1938 showed that there were 2,341 children under 5 years of age living with their leprosy parents, 1183 in Contratación and 1148 in Agua de Dios, just 30 per cent of the leprosy population of these places.

At the present day there are in Contratación (1) The "Guadalupe" preventorium for 250-350 healthy children of lepers. In 1938 there were 257 (2) The "San Bernardo" preventorium, inaugurated in April 1936 for 250 healthy children. To-day there is accommodation for 400 and at times it is full. As an annex to this is (3) a crèche for those under 5 years. In Agua de Dios there are two preventoria (1) The "Nazareth" founded in 1935 with 50 beds in 1938 enlarged to 125 and now with 200 (2) Santa Helena for female children (number not stated) and (3) a crèche which in March 1939 had 43 infants. More crèches are to be asked for to house infants born of leper parents so that they may be cared for from the very beginning.

H H S

SARDJITO Immunisatie van schapen met zuurvaste bacillen, stam Sidik geïsoleerd uit een lepra-patiënt. Immunization of Sheep with the Sidik Strain of Acid Fast Bacilli Isolated from a Leper.—*Generak Tijdschr. v. Nederl. Indist* 1940 Nov 12 Vol 60 No 46 pp 2717-2722 English summary (8 lines)

A method is given to immunise sheep against acidfast bacilli strain Sidik, isolated from a leprosy patient Sidik.

The best result is obtained by injections subcutaneously about every 2 weeks with increasing doses of glycerin broth culture.

The sheep-immune serum has a higher titer of complement fixation power against alcoholic extract of acidfast bacilli strain Sidik than the antileprosy serum of Reensbema.

This complement fixation reaction is to be used for testing antileprosy serum for therapeutic qualities.

NOYAKA (Nobu) Studies on the Infection of Chickens with Leprosy.—*Kitasato Arch. Experim. Med* 1940 July Vol 17 No 3 pp 175-201 With 16 figs. on 4 plates

The results are recorded of the repeated injection of human and rat leprosy into chickens. The author concludes—

"1 When fresh emulsion of human leprosy tissue was inoculated to chickens the majority of them showed an increase of leprosy granulation. Sometimes the liver and spleen also showed leprosy changes. The acid fast organisms were always seen in the leprosy tissues at the site but the viscera where leprosy changes had taken place showed only a few organisms.

"2 Only mild leprosy changes were produced in the second generation and the number of the organisms was also small. The test for third generation was negative.

3 The changes produced by heated emulsion at the site of inoculation were mild and localised and they disappeared quickly. No viscera showed any changes.

4 When an emulsion of rat lepra tissue grown in white rats was inoculated to chickens marked leprous granulation was produced in all the fowls, but only seldom the viscera were involved.

5 The leprous changes produced in the second generation were milder than those of the primary infection and seldom the organism was seen. No viscera were involved.

6 When heated emulsion of rat lepra tissue grown in rat was inoculated the changes produced at the site were mild and localised and disappeared quickly. No viscera showed any change.

7 Since the rat lepra bacilli inoculated to chickens appeared to have lost their infectivity quickly the leprous granulating tissue grown in chicken was emulsified and inoculated to white rats to determine the recovery of pathogenicity. It was found that the tissue taken within one week after inoculation showed pathogenicity but that over ten days showed hardly any pathogenicity in the first generation but when it was retransplanted for the second time the leprous granulation was marked. Those of over 15 days showed entirely negative results.

8 Non pathogenic acid fast organisms do not produce any leprous changes in chicken. If any change was produced it was rather pseudo-tubercular in form. L R

KUDICKE (R) Experimentelle Untersuchungen zur Behandlung der Lepra. [Researches on the Treatment of Leprosy]—*Med Welt* 1940 Jan. 13 Vol. 14 No 2 pp 30-35 [21 refs.]

The author reports on a long series of experimental trials of various preparations on white mice infected with rat leprosy by subcutaneous injection of the causative bacilli. The lesions produced in these animals are flat raised infiltrated areas, which may go on to ulceration in the neighbourhood of the groin or axilla, and the degree of infection at given dates is estimated by the average size of the lesions in the treated as compared with the untreated and the presence of bacilli in the lesions was ascertained by puncturing them. The substances tested are arranged in three classes. The first group includes various esters of chaulmoogric and hydnocarpic acids and some other compounds. Those with which material retardation of the development of the leprous lesions was obtained were Isopropylbenzyl ester glycolcinnamic acid ester glycolacidchaulmoogryl ester and the sodium salt of monochaulmoogryl-glycerphosphoric acid. In the second group of cinnamon preparations the most effective were cinnamic-acid olein ester cinnamon-glycol-chaulmoogryl ester cinnamon allylauryl-ethyl ester and ricinol-acid-chaulmoogryl ester. The third group includes chaulmoogric esters with which a radicle of Rhodanid has been combined, which has been found to have a lethal action on tubercle bacilli. The best results of the whole series in the three groups were obtained with chaulmoogryl rhodanid plus chaulmoogryl cholin-rhodanid and with oleylrhodanid. It is only claimed that retardation of the progress of the leprous infections was obtained but the more active preparations are considered worthy of further study as any drugs that increase the resistance of animals to leprotic infections are likely to prove of value in the treatment of the human disease. L R

MALARIA.

PRELIS OF ABSTRACTS IN THIS SECTION

HAYNES (p. 227) in a paper chiefly devoted to the symptomatology of the malaria epidemic in Nairobi in 1940 states that malaria admissions to hospital in the first six months of the year numbered 2,251 with a case mortality rate of 1.22 per cent as compared with 1,289 malaria admissions in the corresponding months of 1935 which was also a year of high malaria incidence in Nairobi. There was one case of blackwater fever.

COVELL (p. 228) in his annual report on current investigations and research at the Malaria Institute of India in 1939 records that *A. minimus* has been found to be the chief vector in the U P Terai, where spraying of dwellings with pyrethrum insecticides has given promising results against this species. In the Wynad, S. India, where *A. flavistilis* is the only important vector precipitin tests have shown that 96.9 per cent of 1,681 of these mosquitoes contained human blood as compared with only 1.4 per cent of 350 *A. flavistilis* from these two areas. This indicates that the *A. flavistilis* from these two areas, though showing no morphological differences in either egg, larval or adult stages belong to different biological races. In Bengal IYENGAR (p. 228) shows that *A. minimus*, *A. philippinensis* and *A. sundensis* are the important vectors in the hills plains and delta respectively. RUSSELL and RAO (p. 228) discuss the habitat and association of species of anopheline larvae in Madras. CAPOX (p. 229) shows that in Baluchistan malaria transmission takes place up to an altitude of about 7,000 feet.

During the latter part of the dry season of 1938 SHANNON and DE AYDEADE (p. 229) made a survey in Brazil, mainly devoted to the Jaguaribe watershed in Ceará and to the coast between Fortaleza and the frontier of Rio Grande do Norte to delimit the zone of *A. gambiae* infestation. They report that the more immediate threats of further extension to favourable breeding grounds are apparently to the Fortaleza region, to the Araripe Mountain region, and to the Igatu plain. The greater part of Upper North-east Brazil, to which *A. gambiae* is at present confined, is generally unfavourable for breeding, as is in part the Jaguaribe River basin in Ceará. *A. gambiae* appears to prefer small bodies of sun-exposed water to large bodies, and selects sand lined pools rather than mud-lined water deposits. It avoids vegetation. During the dry season the chief breeding sources are man-made shallow wells and irrigation ditches.

CASTRO (p. 230) describes a rapid method of staining thick blood films with Giemsa stain for the diagnosis of malaria.

HEISCH (p. 230) discusses 35 cases of mild dysentery associated with malaria in Africans treated at the Native Hospital in Nairobi. Dysentery bacilli were isolated from seven, and *E. histolytica* from one. No dysentery organisms were isolated from the remaining 27 and although it was not possible to determine whether or not malaria was responsible for the dysenteric symptoms these in most cases responded rapidly to quinine treatment. RO and YOGAWA (p. 230) describe the case of a patient admitted to the Hospital for Infectious Diseases, Taihoku City with a diagnosis of typhoid fever who was subsequently

found by blood examination to have a heavy infection with *P. falciparum*. The patient died comatose.

PAKENHAM WALSH and RENNIE (p 231) found that sulphathiazole (M & B, 760) 2 gm. thrice daily administered to a general paralytic inoculated with *P. vivax* reduced the parasite count from 90 to 4 per hundred fields after the first day's treatment. The count remained at a fairly low level for nine days before quinine was given.

BARROWMAN (p 231) discusses malaria control on estates. The half-mile rule though excellent as a starting point in control is not absolute and must be used with reference to local conditions. Chemotherapeutic control will probably not succeed if the population under treatment exceeds 100 and certain strains of malaria parasites do not respond to atabrin. STRAHAN (p 231) points out that on some estates where the half-mile zone has been efficiently controlled *A. maculatus* still reaches the lines in numbers sufficient to spread the disease. He advocates chemo-prophylaxis where other methods have failed and the trapping of adult mosquitoes in the lines. If *A. maculatus* is found the control area should be extended.

In northern Bengal RAMSAY and ANDERSON (p 232) have found that for efficient work siphons giving a prolonged flush are more effective against *A. minimus* than those which give more frequent but shorter flushes. Large reservoirs are therefore necessary and should give a total discharge of not less than 50 000 gallons for each mile of channel 6 to 8 feet wide. WORTH and SUBRAHMANYAM (p 232) discuss two types of automatic siphons used for flushing streams in Ceylon.

Criticism of afforestation as a means of drying swamps has led HOPKINS (p 233) to set out the advantages claimed for afforestation and drainage of swamps over drainage alone. He describes how it should be carried out and what it does. In Uganda afforestation with *Eucalyptus robusta* against *A. gambiae* and *A. funestus* has proved a cheap and effective measure. Some indigenous species of *Ficus* or mango are useful shade trees for ditches.

JOHN (p 233) shows that the top minnow *Apocheilichthys lineatus* common in Travancore is actively larvivorous and prefers mosquito larvae to other aquatic organisms. In wells it may completely control mosquito breeding.

CHOPRA *et al* (p 234) found that the leaves of *Tephrosia vogelii* are not useful in larvicide preparations.

WATS and BHARUCHA (p 234) describe the apparatus they have found most useful for insecticide sprays in houses. C IV

HAYNES (W S) The Malaria Epidemic.—*East African Med J*
1940 Sept Vol. 17 No 6 pp 216-221

Judged by the number of admissions to the Native Hospital and Infectious Diseases Hospital the malaria epidemic in Nairobi in 1940 has been of unusual severity. During the first six months 2,251 cases of malaria were admitted to these hospitals as compared with 1,289 admitted to the Native Hospital in the corresponding months of 1935 which was another year of unusual malaria severity. The case mortality rate was 1.22 per cent. There was one case of blackwater fever. The paper is concerned chiefly with symptomatology.

Norman White

INDIA. Annual Report of the Malaria Institute of India for the Year 1939 [COVELL (G) Director].—16 pp. 1940 Delhi Manager of Publications [Annas 10 or 1s.]

This report is a record of a year's successful work and continued usefulness. To the malarialogist, of chief interest will be the sections dealing with current investigations and research. These however call for but small notice here. The results of these inquiries are nearly all published in the Institute's admirable journal and are duly summarized in this Bulletin. Attention might perhaps be directed to one or two points of interest. Further investigation in the U.P. Terai has confirmed the belief that *A. minimus* is the chief vector in this region. In Barpur an infectivity of 18 per cent. was recorded for this species at the height of the malarial season. Here too the spraying of dwellings with pyrethrum insecticides has given encouraging results: none of the *A. minimus* collected in sprayed villages was found infected with malaria parasites. The number of mosquitoes dissected, however, was comparatively small.

Another observation of interest concerns *A. floricollis*. This is the only important vector in the Wynad, South India. Tests showed that 98.9 per cent. of 1,681 *A. floricollis* from the stomach-contents of only 61 of 350 *A. floricollis* from the U.P. Terai reacted positively with anti-human serum. No morphological differences have been detected in either the egg, larval or adult stages of *A. floricollis* caught in these two areas respectively but it is clear that they belong to two quite different biological races.

IRENGAR (M. O. T.) Further Observations on Vectors of Malaria in Bengal and Notes on the Seasonal Infectivity of Anopheles.—*Jl. Malaria Inst. of India* 1940 June Vol. 3 No. 1 pp. 115-123

The author has previously reported the results of the dissection of a large number of Anopheles from different parts of Bengal see this Bulletin 1939 Vol. 3 p. 1005. The results of the examination of another 11,425 Anopheles caught in dwellings in 14 localities in Bengal are now recorded. Of the 18 species examined natural infection was found in five: *A. philippinensis*, *A. minimus*, *A. annularis*, *A. varuna* and *A. sandancus*. The sporozoite rate of *A. philippinensis* was 3.9 of *A. minimus* 9.3 and of *A. sandancus* 5.3 per cent. the total infection rate of these three species being 6.3, 18.6 and 15.8. The important vectors of malaria in Bengal are *A. philippinensis* in the plains, *A. minimus* in the submontane area and *A. sandancus* in the deltaic area. The infectivity of *A. philippinensis* was highest from September to November; the infection rates of *A. minimus* were high from June to September.

RUSSELL (Paul F.) & RAO (T. Ramachandra) On Habitat and Association of Species of Anopheline Larvae in South-Eastern Madras.—*Jl. Malaria Inst. of India* 1940 June Vol. 3 No. 1 pp. 153-178. With 3 charts & 19 figs. on 10 plates.

This paper contains a wealth of detailed information concerning anopheline larvae collected during two years in the town and taluk of

Pattukkottai in the Tanjore district of southern Madras. More than 140 000 larvae in 6 033 collections were taken from wells tanks ricefields waste irrigation water irrigation canals and channels borrowpits ditches seepage and spring pools rain water pools hoofmarks, etc. The species of larvae in order of abundance were *A. culicifacies subpictus varuna pallidus hyrcanus annularis vagus jamesi stephensi barbrostris tessellatus* (16 specimens) and *aconitus* (one specimen). An interesting table shows the percentage of times each species was taken in association with each of the other species. This association, indicating similar habits was most marked between *A. culicifacies* and *A. subpictus*, *A. hyrcanus* and *A. pallidus* and between *A. annularis* and *A. jamesi*. *A. stephensi* was the most exclusive species. Excellent photographic illustrations show types of all the most important breeding places. N IV

CAPON (P. J. L.) A Brief Investigation regarding the Height above Sea-Level at which Malaria occurs in Baluchistan.—*Jl Malaria Inst of India* 1940 June. Vol 3 No 1 pp 125-127

An outbreak of malaria occurred among British troops encamped at Kahan Tangi in Baluchistan, 6 500 feet above sea level. Previously it was thought that the altitude precluded the possibility of malaria transmission. The author made an inquiry in a number of villages situated at heights varying from 6,200 to 8 000 feet. spleen examinations were made and sick persons were examined. It would appear that in this region malaria transmission ceases at a height of about 7 000 feet. N IV

SHANNON (R. C.) & DE ANDRADE (Gastão César) Dry Season Observations on the African Mosquito *Anopheles gambiae* in Brazil in 1938.—*Amer Jl Trop Med* 1940 Sept. Vol. 20 No 5 pp 641-668 With 10 figs. (1 map)

1 The greater part of Upper Northeast Brazil the region in which *gambiae* is at present confined is generally unfavorable for the breeding of this species.

2 In Ceará *gambiae* was found only in the Jaguaribe River basin, and the invasion of this basin, especially in the upper reaches, was far from complete owing, in part, to the unfavorable conditions existing here.

3 The more immediate threats of further extension to highly favorable breeding areas are apparently (a) To the Fortaleza region by natural breeding or by train and highway transportation (b) to the Araripe Mountain region by train and highway transportation (c) to the Iguatú plain, by natural extension along the Jaguaribe, or by auto or train.

4 Observations indicate that *A. gambiae* prefers small bodies of sun-exposed water to large bodies. Sand lined pools are apparently selected in preference to mud lined water deposits. Waters with vegetation are avoided.

5 During the dry season the chief breeding sources in this semiarid country are created by man. *Cacimbas* or shallow wells, excavated in and near the wetter portions of the river beds to supply water for household and agricultural purposes and the irrigation ditches in the areas with subterranean and seepage waters.

[See also PINO this *Bulletin* 1940 Vol. 37 p 498]

CASTRO (Guillermo) The Rapid Diagnosis of Malaria from Thick Blood Smears.—*Jl Lab & Clin Med* 1940 Sept. Vol 25 No 12 pp 1308-1310

A quick staining method for thick blood films is described. Smear a large drop of blood in a circle of about half an inch in diameter near the end of a slide. Place the slide on a hot plate at about 50°-60°C. the blood will dry in less than a minute. Make a semicircle with a wax pencil enclosing the blood between the pencil mark and the end of the slide. To 3 drops of old distilled water add 1 or 2 drops of Giemsa's stain. This is sufficient to cover the area of the slide enclosing the blood. Stain for 3 to 5 minutes. Wash gently in a washing tray containing tap water or preferably old distilled water submerging the slide horizontally moving it backwards and forwards and removing it slowly. Drain off the excess water and stand the slide almost vertically on the hot plate. Directly the smear begins to lose its moist appearance it should be removed from the hot plate. Further heating causes decolorization. The result is that of the usual well stained thick blood film. The smears must be fresh. With increasing interval between the taking of the blood and staining the stain loses its ability to dehaemoglobinize the red cells. Poor results are obtained with blood taken more than twelve hours before staining.

N IV

HEISCH (R. B.) Malaria and Dysentery.—*East African Med Jl* 1940 Sept. Vol 17 No 6 pp. 225-229

The author discusses 35 cases of dysentery associated with malaria that were treated in the Native Hospital in Nairobi. The dysentery was of a mild type. Dysentery bacilli were isolated from seven of these cases and *Entamoeba histolytica* from one. Whether malaria was responsible for the dysenteric symptoms it was not possible to determine. In many cases however the administration of quinine was followed by prompt alleviation of these symptoms.

N IV

RO (Mantoku) & YUGAWA (Hukau) Protozoological Observations on a Severe Case of Malaria Tropica, with Many Schizonts in the Peripheral Blood, Clinically Mistaken for Typhoid Fever.—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1940 Sept. Vol 39 No. 9 [In Japanese pp 1493-1499. With 1 chart. [19 refs.] English summary p 1500.]

The patient whose case is here recorded was admitted to the Hospital for Infectious Diseases Taihoku City with a diagnosis of typhoid fever presumably on account of his history of fever and his drowsy condition. Examination of the blood revealed a red cell count of 4 170 000 white cells 10 600 per cmm. haemoglobin 83 per cent., colour index 1.0 [not 0.9 as stated]. A differential leucocyte count gave lymphocytes 19 large mononuclears 7.5 neutrophils 73.5 per cent. Smears showed a heavy infection with *P. falciparum* (225,597 in 1 cmm. of blood, it was estimated) in all stages of development. The patient died comatose. [In the English summary, no mention is made of any autopsy to prove that death was due to cerebral malaria nor is there any mention of Widal or cultural tests to exclude enteric fever. The two diseases may and in some countries do co-exist and

that not rarely See this *Bulletin* 1916 Vol. 8 p 32 1919 Vol. 14 pp 218 264 1920 Vol. 15 p 252 1921 Vol. 17 p 221 Vol. 18 p 136 1928 Vol. 25 p 400 1929 Vol. 26 p 925 1936 Vol. 33 p 798.] H H S

PAKENHAM WALSH (R) & RENNIE (A. T) Sulphathiazole in Malaria
—*Lancet* 1940 Oct 19 p 485 With 2 figs.

The authors publish a graph illustrating the effect of sulphathiazole (M & B 760) on the rigors and parasites of a general paralytic who had been inoculated with *P. vivax*. The maximum dose used was 2 gm. thrice daily. After the first day's treatment the parasite count fell from 90 to 4 per hundred fields and remained at a low level for nine days when quinine was given. N IV

BARROWMAN (Barclay) Some Random Reflections on Estate Medical Practice.—*Jl. Malaya Branch Brit Med Assoc* 1940 June Vol. 4 No 1 pp 1-12

This is a presidential address to the local branch of the British Medical Association. It is concerned for the most part with malaria control. Being based on large practical experience the reflections are all interesting but being random they do not lend themselves to summary in small space. The half-mile working rule for mosquito-breeding control, and recent criticism as to the inadequacy of the rule are discussed. It remains the most important starting point in malaria control. It must, however be used intelligently. It is not a panacea for all difficulties. There is no such thing in malaria control. Sub-soil drainage especially fascine drainage is discussed in thick clay outcrops fascine drainage is superior to pipe drainage. If timber has to be imported pipe drainage is preferable pipes are less bulky and so more easily transported.

Malaria control is the work of the practising health officer and not of the research laboratory.

Some interesting observations were made regarding *A. ludlowi* malaria and the special circumstances in Malaya in which *A. barbi rostris* may become an important vector of malaria. With regard to chemotherapeutic control of malaria the author considers that such control is unlikely to be very successful if the population under treatment exceeds a hundred the case rate and the death rate may well be reduced but such reduction cannot compare with that obtained by anti-mosquito measures. There are certain strains of malaria parasites which do not respond to atabrin. These few points may serve to indicate the scope of a stimulating address. N IV

STRAHAN (J. H.) A Review of the Results of Malaria Control on Rubber Estates in Negri Sembilan South from 1931-1939.—*Jl. Malaya Branch Brit Med Assoc* 1940 June. Vol. 4 No 1 pp 53-65 With 12 graphs.

This study is based on the returns and reports concerning the health conditions of the estate population of Negri Sembilan South, over a period of nine years. The malaria death-rate of this population is 3 or 4 times as great as that of the Federated Malay States as a whole for the Indian population only this rate is from 4 to 6 times as high. One quarter of estate Indians who died in the F.M.S. died in these

districts of which the Indian population is but 5 per cent. of the total Indian population employed. The author briefly describes the conditions on seven of these estates. Nearly everywhere there is intensive breeding of *A. maculatus*. In some estates oiling has been conscientiously carried out but there has been a rigid dependence on the half-mile oiling zone for protection. Reasonable control has not been established—an adequate number of *A. maculatus* reach the lines from outside the protected area. The author recommends that where the measures adopted have failed seriously chemo-prophylaxis should be given a trial. Adult mosquito trapping should be used in the lines. If *A. maculatus* be found, the control area should be extended, by the use of cover, fascine drainage where possible and flushes.

RAMSAY (G. C.) & ANDERSON (Ian R.). An Inverse Automatic Siphon Sluices on a Group of Tea Estates in Northern Bengal.—*Jl. Malaria Inst. of India* No 1 pp 83-97

In 1939 MACDONALD described a flushing siphon, which was successful in Ceylon for the control of anopheline breeding. *Bull. Ind. Malaria* 1939 Vol 38 p 926. This siphon has been tried on a group of tea estates in Northern Bengal. The average annual rainfall in Northern Bengal is over 200 inches and most of this falls between June and September. The foundations of the first lot of siphons installed were washed away. In other attempts on sandy soil the water above the dam disappeared and reappeared some ten yards downstream. Constructional alterations surmounted these difficulties but it was found that the discharge of the Ceylon siphon 475 gallons per minute in a channel 2 feet wide, had little effect on the breeding of *A. minimus* if there were but little fall. A Doonars siphon was accordingly constructed, on similar lines but with four times the capacity. These siphons work well. The paper describes a method of estimating the number of siphons required for a water channel. A prolonged flush controls a greater length of channel than more frequent shorter flushes. Large reservoirs are therefore required. A total discharge of 50,000 gallons is the minimum amount necessary to control a mile of a channel 6 to 8 feet wide. The Doonars siphon is heavy and so is not transportable but its local construction is not difficult and not costly.

WORTH (H. V.) & SUBRAHMANYAM (K.). Anti-Larval Flushing of Rivers and Streams in Ceylon.—*Jl. Malaria Inst. of India* 1940 June Vol 3 No 1 pp 81-92 With 3 figs & 2 plates

Two types of automatic siphons are described. The "Block" type is constructed of cement concrete blocks cast from a standard mould, prepared on the site the siphon unit forming part of the dam. The defect of this form of construction is the lack of curves in the internal ducts of the siphon—impaired efficiency arising therefrom has to be compensated by increased capacity. The "Funnel" type is constructed also of cement concrete cast in situ and also forms part of the dam. In this type sharp corners are eliminated and the ducts are graduated. The paper describes the action of five such siphon installations in dams varying in width from 20 to 64 feet. The effects of the flushing on the channel and on larvae are described. When working

with a head of from 40 to 25 inches it should be possible to control a total distance of 5 000 feet below the dam. The cost of a battery of siphons and dam complete works out at from Rs.20 to Rs.25 per foot of width of river dammed. Stone pitching of banks up to normal flood level is necessary for some distance above and below the dam. Where the dry weather flow is very low and where accessibility to the site permits hand-operated gates may be preferable to automatic siphons.

N IV

HOPKINS (G H E) Afforestation as a Method of drying up Swamps.—
—*East African Med Jl* 1940 Aug Vol. 17 No 5 pp 189-194

The author protests against generalizations that have been made as to the inefficiency of afforestation as a means of drying up swamps. He claims that in Uganda and probably in other parts of Africa where the main conditions and the malaria vectors *A. gambiae* and *A. funestus* are the same afforestation is a cheap and effective method of reducing the breeding of anophelines. Swamps in Uganda are either papyrus-swamps or grass-swamps the latter are more dangerous. Though breeding of the two vectors therein may not be intensive the large size of such swamps may make even diffuse breeding important. The desiderata of afforestation are that the swamp should be dried leaving a minimum number of ditches which should be heavily shaded. Afforestation of the main part of the swamp is done with some species of *Eucalyptus*. *E. robusta* is the species normally most useful in Uganda. Some preliminary drainage is generally necessary. The spacing of the trees should be such as to produce the maximum leaf area not the maximum amount of saleable timber. Usually a considerable number of the original ditches will become dry the remainder must be heavily shaded. Some indigenous species of *Ficus* or mango are useful shade trees. A few residual pools are commonly left these should be filled if possible. The first cost of afforestation is fairly heavy but the revenue obtainable from poles and fuel compensates for this. It may make a profit. [Afforestation in Kenya and Uganda was discussed by JAMES in this *Bulletin* 1930 Vol. 27 pp 631-634]

N IV

LANDIE (Thomas A.) New Developments in Underground Drainage for Malaria Control.—*Amer Jl Public Health* 1940 July Vol 30 No 7 pp 738-742. With 7 figs

JOHN (C C) Observations on the Utility of *Aplocheilichthys lineatus* (Cuv & Val.) for Mosquito Control.—*Jl Malaria Inst of India* 1940 June Vol 3 No 1 pp 67-80 [11 refs]

This is a record of observations on the life history and feeding propensities of *Aplocheilichthys lineatus* one of the Indian top minnows. Its congener *A. panchax* which is abundant in Bengal Orissa, Burmah, Thailand and Malaya is markedly larvivorous. It is not found in the peninsular part of India where it is replaced by *A. lineatus*. The latter is very abundant in the coastal plains of Travancore where the observations recorded were carried out. *A. lineatus* is carnivorous and shows a very decided preference for mosquito larvae even in waters rich in other forms of aquatic organisms. It remains active in

hot surface gave still better results. There was considerable spattering, but this was overcome by directing a spray of the solution against the heated surface. The results of investigations on the effect on the house-fly of pure rotenone and pyrethrum oleoresin applied separately or in combination in this manner are reported. The solvent used was safrol, with which a copious fog, or aerosol, is produced on account of its high boiling point. Per 100 cc. of solution, 2 gm. rotenone or commercial pyrethrum oleoresin having a total pyrethrin content of 25.1 per cent., or 1 gm. of each was used. The apparatus consisted of an atomiser with the nozzle mounted 7 ins. above the centre of an electric hot plate which was kept at about 375°C (707°F). A small electric pump was used to maintain the air pressure. The tests were made in a furnished room with a capacity of 1100 cu. ft. and a temperature of 28-30°C [82.4-86°F] in which about 150 flies were liberated and 10 cc. solution was sprayed for each test. Knockdown was estimated after 10 minutes, and the flies were removed to a cage and fed after an exposure of 1 hour. In two tests, the percentages of flies down after 10 minutes and dead after 48 and 72 hours were 100, 72 and 74 with pyrethrum oleoresin, 15, 65 and 83 with rotenone and 90, 81 and 90 with equal parts of the two. There was a mortality of 4 per cent. in the untreated control, and the effect of safrol alone was slight. There was no visible deposit but the odour was noticeable. When about 500 adult mosquitos of the genus *Culex* from 2 to 3 days old were exposed for 10 minutes to the mist produced by 20 cc. of a solution containing 100 mg. pyrethrins in ethyl alcohol, all were down within 3 minutes and 99 per cent. were dead after 48 hours. No males survived. Carbon dioxide under pressure was used in the atomisation to reduce the risk of fire and the formation of aldehydes. Rotenone and pyrethrum applied in this form gave little or no mortality of large nymphs and adults of the American cockroach [*Periplaneta americana* L.]. The manner in which dispersion is accomplished is discussed. To obtain the same mortality by burning as by spraying a hot surface about 20 times as much material is required. Other advantages of the dispersion method are that under favourable conditions the insecticide will remain in suspension in air for several hours, less solvent is required than for spraying, there is practically no deposit, and toxic action is accelerated.

HEXTER (Marshall). Glass Tubes for rearing *Phlebotomus* and Other Insects.—*Science*. 1940. July 26. Vol. 92. No. 2378. pp. 91-92. With 1 fig.

All methods of rearing sandflies in the laboratory involve keeping the engorged females at a high degree of humidity in a vessel with a moist inner surface on which the eggs may be laid. The authors fill one end of a tube (of length 8 cm. and bore 8-9 mm.) with plaster of Paris which extends into the tube for 10-12 mm. The open end is stoppered with cotton. These tubes may be made in quantity by standing bundles of cut tubing in dishes of freshly mixed plaster. Before use the plaster is moistened by contact with wet cotton and when containing sandflies the tubes are stored, plaster end down, in moist earthen pots or in pans with a thick bottom layer of plaster. The highest degree of moisture short of condensation on the glass walls

is desired. Eggs may be immersed in water and transferred to a breeding pot by pipette.

These tubes may also be used as containers for transporting sandflies and for the breeding of fleas

C H

PUBLIC HEALTH REPORTS 1940 July 19 Vol. 55 No 29
pp 1312-1314 Chigger Mites.

The Chigger Mite of America must not be confused with the Chigoe or Jigger of the tropics. The former is the larval form of one of the Trombididae, known now as *Leptus rileyi* [it has had many synonyms] the latter is the flea *Tunga penetrans*. It is with the former that the present paper deals. It is oval in shape red in colour 150 μ broad when unfed, legs and body surface covered with feathered hairs. The adult is not parasitic. Eggs are laid in the ground and hatching takes place when the warm spring weather sets in. The mites are widespread—from Long Island to Mexico and from the Atlantic Coast to the Rocky Mountains. The larvae attack domestic animals small mammals birds and reptiles as well as man. They attach themselves to the skin especially where this is thin or folded they do not burrow and when fully engorged drop off. They inject a liquefying secretion which causes intense itching followed by weals and papules and perhaps vesicles. Secondary infection may be set up by scratching. They are not known at present to transmit any disease but if the lesions are numerous they may cause fever headache and nervous disturbances from the pruritus and loss of sleep.

The local application of kerosene or of 95 per cent alcohol rapidly kills the larvae but they move rapidly over the skin and are not easy to find. A lather of soap left on will give some relief or an application of collodion with metaphen which not only relieves the itching but also prevents infection. Prevention consists in sprinkling the clothes with flowers of sulphur if it is necessary to pass through weeds tall grass or heavy undergrowth

H H S

NIRO (Flavio L.) & RIVAS (Carlos I.) Nota parasitológica a propósito de una observación de miasis furunculosa por larva de *Dermatobia hominis* [A Case of Human Myiasis due to the Larva of *Dermatobia hominis* (cyaniventris)]—*Boletín Inst. Clín. Quirúrg.* Buenos Aires 1940 Apr-May Vol 16 No 133 pp 214-219 With 8 figs.

A woman of 49 was basking in the sun clothed in a bathrobe when she felt a prick on the internal aspect of the lower third of the left thigh. It caused some itching and in the course of the ensuing days a redness appeared with some swelling to the size of a pigeon's egg. An abscess developed and at the end of a week a larva was abstracted whose measurements and description are given and it was identified as that of *D. hominis*

H H S

SAPOEAN Ontjomvergiftiging in het onderdistrict Tjikidjing (Reg. Madjalengka) [Ontjom Poisoning in Tjikidjing (Madjalengka)]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Mar 5 Vol. 80 No 10 pp 598-601

Ontjom is a preparation of peanut press cake, made from *Arachis hypogaea*. Two occurrences of toxic effects following its ingestion are

squirrel *Otospermophilus grammurus beecheyi*. If rat is eaten by dog the nymphs if they reach and remain in its digestive tract are digested. If the dog vomits, the nymph freed by digestion and by its active movements reaches the mouth and nasal cavities, becomes adult and passes eggs in about six months and may live for about 2 years, the eggs passing in the nasal mucus at first constantly and later at intervals of days or weeks. Active migration of nymphs swallowed in food from stomach to nose was without evidence. It seems that they may actively reach the nose more directly in the host's act of feeding.

Clayton Lane

TROPICAL DISEASES BULLETIN.

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[No 5

SUMMARY OF RECENT ABSTRACTS *

IV TRYPANOSOMIASIS

General and Epidemiology

In a statement of the present position of sleeping sickness in the British Tropical African Territories LESTER (p 7) discusses the effect of the disease and of measures of control on the human and cattle populations. He points out that with the existing fairly close contact between the medical staffs and the natives it is not likely that any considerable outbreak will long go undetected and he makes the point that there is a tendency for fly free areas to become overpopulated and overstocked and that soil impoverishment and soil erosion are increasing. This will continue unless the spread of tsetse is stopped and new areas are reclaimed. He states that in Nigeria the people tend to live in towns and villages. This may lead to a high rate of infection, but the communities are comparatively easy to protect. In East Africa on the other hand, the people are more scattered living in family groups. Infection rates are therefore lower but protective measures are more difficult than in West Africa.

HARDING (p 697) in Nigeria, has attempted to correlate the deaths from all causes with the sleeping sickness incidence in two areas. In the first a close correlation was found which extended even to infant mortality an unexpected finding. In the second no correlation was evident, and it is concluded that here the disease was not fatal. The first district lies in the middle of a sleeping sickness belt and there are very free means of communication. The second is on the edge of the belt and is not traversed by main roads or railways. It may be therefore that in the first there is considerable multiplicity of strains not present in the second district and that this fact may account for the greater virulence of the disease there.

In the course of an experiment lasting four years CORSON (p 10) has shown that a strain of *Trypanosoma rhodesiense* maintained in sheep and antelopes and transmitted by *Glossina morsitans* has retained its power of infecting these animals. Though the antelopes varied greatly in their resistance all the infected animals remained infected.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Disease Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

long enough for the trypanosomes to have been transmitted many times by tsetse flies if the animals had been living under natural conditions in fly areas.

In Nigeria during 1938 BRIERCLIFFE (p. 694) reports that the sleeping sickness teams examined 378 109 persons, and found 21 073 to be infected [a rate of about 5 per cent]. Other cases were diagnosed at hospitals and dispensaries and in all, over 35 000 cases were discovered during the year. In 1939 however the Report of the Colonial Development Fund Scheme (p. 665) states that of 485 000 persons examined, 19,855 were found to be infected [a rate of about 4 per cent]. This is compared with the figures obtained in 1935 when the rate was over 20 per cent. In the Benue Province however which had not previously been surveyed a rate of 6.9 per cent was found in 1939.

In the Gold Coast, SAUNDERS (p. 397) records percentages of infection varying from 1 to 9 in different areas. About 20 per cent of the patients have remained positive from one year to the next and have had neither symptoms nor treatment in the interval.

In reporting on sleeping sickness in the Belgian Congo, VAN HOOR (p. 397) shows that in the 10 years preceding 1938 the index of new infections fell from over 1 per cent. to about 0.27 per cent. He gives figures of the persons examined and of the new and old cases under control. DE BRAUWERE (p. 398) gives the FORÉMI figures for 1938 in the Belgian Congo and quotes a similar percentage (0.28) of new infections found.

VOGEL and RIOT (p. 8) give figures of cases treated in the French colonies during 1937. Sleeping sickness is serious in the Ivory Coast and in Togo but in the Cameroons and French Equatorial Africa it is now only feebly epidemic. In the French Sudan, SUDAN and TUNISIA (p. 9) show that sleeping sickness is most prevalent in those areas which adjoin the Ivory Coast and French Guinea. It is most common along the Volta Noire, the Bani and the Niger.

KAUTZE (p. 397) reports that in Uganda in 1938 as in previous years, most cases were found in the West Nile area.

Aetiology

CORSON (p. 9) has summarized the work he has carried out during the years 1930 to 1938. Two of his conclusions are: (1) It must be very difficult to show a decrease and practically impossible to show complete loss of infectivity to man of a strain of *T. rhodesiense* maintained in sheep and antelopes through *G. morsitans*. (2) A strain of *T. gambiense* maintained in Cercopithecus monkeys by cyclical passages through *G. morsitans* seemed to undergo no change in morphology or virulence during more than four years.

DUKE (p. 11) discusses the three main views on the affinities of *T. rhodesiense* namely: (1) that it is a variant of *T. gambiense*, (2) that it is a human strain of *T. brucei*, and (3) that it is a separate species. Evidence at present available indicates that *T. rhodesiense* is considerably less adapted biologically to man and domestic animals than to wild game. The nature of the mammalian host may influence the pathogenicity of a trypanosome for man—thus attempts to transmit from antelope to man by cyclically infected flies might fail, whereas similar attempts to transmit the same strain from monkeys might succeed.

KLEINE and KUXERT (p 702) infected calves with *T rhodesiense* and then treated them with Bayer 205. The animals were immediately cured but in controls the trypanosomes remained in the blood for several months though they were scanty and the calves remained in good condition.

REICHENOW (p 14) has shown that cultures of *T gambiense* and *T congolense* are capable of undergoing incipient development in *G morsitans* in almost all cases but that permanent infection of the fly is not more easy to obtain with cultures than with blood forms. Under certain circumstances however cultural forms may undergo complete development in *Glossina*.

LWOFF and CECCALDI (p 13) have shown that the view of REICHENOW that strains of pathogenic trypanosomes maintained for years in laboratory animals cannot be cultivated is wrong. They have succeeded in cultivating *T gambiense* under these conditions in Razgha's medium by using Liquolde Roche as anticoagulant but they note that the blood of some individuals used in the preparation of the medium, inhibits cultivation while that of others permits it. CHABAUD (p 12) has succeeded in cultivating *T rhodesiense*, *T brucei* and *T equinum* in the allantoic membrane of fowl embryo obtaining better results with citrated than with defibrinated blood. The trypanosomes remained virulent for the mouse. LONGLEY *et al* (p 12) have shown that an arsenic resistant strain of *T rhodesiense* grown in the allantoic cavity of fowl embryo showed no change in either virulence or arsenic resistance after 8 subcultures over a period of 41 days. The technique of culture is simplified and is described and it is noted that *T equiperdum*, *T brucei*, *T evansi* and *T hippicum* were also readily cultivated in the same way and maintained their virulence. None of these species was infective for the hatched chick.

STEINFELD (p 698) has failed in attempts to destroy arsenic resistance in *T gambiense* by various physical and chemical agents but reports some reduction of the degree of resistance by repeated exposure of the trypanosomes to 10 per cent glucose *in vitro*.

DE BORCHGRAVE (p 406) has found that argo-flavin and atebryn though practically inactive clinically can remove the infectivity of ordinary and arsenic resistant strains of *T gambiense* for guinea-pigs if the drug concentration reaches 2 per 1 000. He also notes that argo-flavine has a photodynamic action when used in conjunction with strong light.

In an experiment on the cultivation of trypanosomes in media containing human blood HAWKING (p 697) found that there was no evidence of inhibition of growth when blood from a person previously infected was used in the medium. By this technique therefore there is no evidence of immunity against a second infection. Trypanosomes have been grown in a medium containing blood in which there were appreciable amounts of Bayer 205.

Transmission

NASH (p 15) has studied the ecology of the puparium of *G morsitans* and *G tachinoides* in N Nigeria, where *G palpalis* is not found. He shows that soil temperature and soil water content vary greatly according to the seasons and that *G morsitans* breeds in open woodland in the wet season in small thickets in the early dry season and in dense forest islands in the very hot weather. This cycle

SALEUN (p 403) notes that in French Equatorial Africa a large proportion of cases were diagnosed by the finding of trypanosomes in the cerebrospinal fluid when other methods for instance gland juice and blood examination had proved negative. Treatment of early cases as is usual was more successful than that of those diagnosed in the later stages

GEORGIADIS (p 402) examined 11 patients with sleeping sickness in whom lumbar puncture was performed. In 7 there was no change in the cerebrospinal fluid attributable to the puncture even if this was repeated two or three times but in 4 there was an increase in lymphocytes after the first puncture

KUNEK (p 17) brings evidence to show that sleeping sickness in the Tabora district of Tanganyika Territory has increased in virulence since 1927. In that year the patients constantly showed enlarged cervical glands and changes in the cerebrospinal fluid were rare before the third week. In 1933 however glandular enlargement was rare and cerebrospinal fluid changes were often found during the first few days. It appears that the trypanosomes now pass quickly through the lymphatic barrier

LAVIER and LEROUX (p 401) found pronounced epicarditis, sclerotic endocarditis and periarterial myocarditis with arteritis of the branches of the coronary vessels in the hearts of two patients who died of sleeping sickness in the Belgian Congo. The lesions were so extensive that the physiological function of the heart must have been seriously disturbed

SICÉ *et al* (p 18) report two cases of sleeping sickness in the French Sudan, in which signs of Parkinsonism were seen.

PICARD and BRUMPT (p 18) record the case of a patient with sleeping sickness who had not lived in Glossina country for 15 years before the onset of symptoms. Either there was a remarkably long latent period or as the authors surmise the disease may have been contracted in some other way than through Glossina.

Treatment

LOURIE and YORKE (p 404) discuss the trypanocidal action of certain aromatic diamidines of which 4,4'-diamidino stilbene is the most active giving permanent cures in mice infected with a laboratory strain of *T. rhodesiense* in doses of 0.01 to 0.0125 mgm per 20 gm. weight. The maximum tolerated dose is about 30 times as great as the minimum curative dose. Tests on rabbits in an advanced stage of infection gave equally good results. None of the drugs was effective against *T. cruzi*, *Spirochaeta recurrentis* or *Spirillum minus* but there is definite action against *Babesia canis* in puppies. DEVINE (p 700) has studied the effect of 4,4'-diamidino stilbene on the blood sugar and blood urea of experimental animals.

DUBOIS and KOHN (p 701) conclude from experimental work that in animals infected with trypanosomes and treated with Bayer 205 the trypanosomes fix the drug and that the integrity of the reticulo-endothelial system is not essential for its action.

HAWKING (p 701) finds great individual variations in the amount of Bayer 205 present in the plasma of persons who have received one or more injections and recommends that the treatment of Europeans with sleeping sickness should be controlled by chemical estimation of the drug in the blood. In some patients Bayer 205 could be found

HU (C. H.) The Influence of Parenterally Introduced Killed Bacteria and Foreign Proteins on Experimental Kala Azar Infection in Hamsters.—*Chinese Med J* 1940 Mar Supp 3 pp 179-185 With 6 figs on 3 plates.

Owing to the fact that certain intercurrent infections in Kala azar such as pneumonia and cancerous may be followed by complete disappearance of leishmania from the body experiments were instituted to test the influence of repeated intraperitoneal injections of bacteria horse serum or beef broth on a kala azar infection in hamsters. It was found, after weekly injections over a period of two months that in no case was leishmania infection prevented though, from the feebleness of the infection in some cases it appeared that some degree of resistance had been conferred. It was noted that two types of spleen enlargement occurred. In one the greatly enlarged organ contained scattered nodules composed of reticulo-endothelial cells in which relatively few leishmania occurred. In the other case the spleen was less enlarged, while the reticulo-endothelial proliferation was less active. The cells, however were not collected to form nodules but were more or less uniformly scattered through the organ. In this case the cells were loaded with parasites. C. V. H.

SMITH (R. O. A.) HALDER (H. C.) & AHMED (I.) Further Investigations on the Transmission of Kala Azar. Part I. The Maintenance of Sandflies *P. argentipes* on Nutrient other than Blood.—*Indian J Med Res* 1940 Oct Vol 23, No 2 pp 575-579 Part II. The Phenomenon of the Blocked Sandfly.—*Ibid* pp 581-584 Part III. The Transmission of Kala Azar by the Bite of the Sandfly *P. argentipes*.—*Ibid* pp 585-591

In this series of papers the authors give an account of further experiments which go far to establish beyond doubt the responsibility of *Phlebotomus argentipes* in the transmission of Kala azar in India.

In the first it is shown how it has been found possible to keep sandflies alive for long periods both before and after a feed of blood, by allowing them to nourish themselves on raisins. Thus of 1,566 flies which had a blood meal and were subsequently fed on raisins 855 were alive on the tenth day. After the digestion of the blood meal on the third day the flies are introduced into a glass lamp chimney of about 700 cc. capacity where they have access to moistened cotton wool and raisins. Eggs are deposited on the moist wool. After oviposition has once taken place no more egg laying occurs owing to absence of further blood meals. Apart from the longer survival of the flies there is the added advantage from the point of view of transmission experiments that the development of leishmania is not interrupted in any way—on the contrary a larger proportion of flies is found with a heavier infection. This observation has shown that the previous assumption that blood feeds would be necessary for the satisfactory development of leishmania in the flies was erroneous. Whether in nature the flies survive on fruit juices with occasional feeds of blood has not yet been determined but there is evidence that they resort to vegetation.

In the second paper the development of leishmania in flies kept under the new conditions is discussed, particularly with reference to the phenomenon of blocking first noted in 1926 by SHORTT, HARRAUD and CRAIGHEAD who compared it with the blocking of the oesophagus

of fleas with plague bacilli [this *Bulletin* 1927 Vol 24 p 132]. As with blocked fleas the flies in this condition are unable to ingest blood, though they make strenuous efforts to do so. It thus comes about that it is possible to identify the blocked flies during life owing to this failure to imbibe blood after attempting to feed on an experimental animal. Of 225 known positive flies dissected 58 had been diagnosed as blocked and of these 49 at least were shown by dissection to be heavily infected with flagellates. Such blocked flies do not live longer than one or two days, so that for purposes of transmission experiments it was necessary to isolate them as soon as recognized. As a rule the flies after a first feed on a kala azar patient are kept on a diet of raisins till the tenth day before being offered a second blood meal on an experimental animal. Flies which succeed in ingesting blood and which are therefore not blocked were separated and kept for future blood feeds but in no case were blocked flies found amongst these when offered a third or fourth blood meal. Blocked flies are thus found only amongst those attempting to feed on blood a second time. It is assumed that the vain attempts made by the blocked flies to suck blood result in flagellates being dislodged and discharged into the proboscis wound in the skin.

The third paper describes the actual transmission experiments. It is recalled that the first successful transmission of *Leishmania donovani* by the bite of the sandfly *P. argentipes* was obtained in a hamster in 1931 by SHORR SMITH SWAMINATH and KRISHNAN [this *Bulletin* 1932 Vol 29 p 107]. It was one of two which had survived 17 months after the beginning of the experiment. In 1933 NAPIER SMITH and KRISHNAN infected two out of 28 animals while in 1935 SMITH LAL MUKERJEE and HALDER succeeded with one out of 16. These results though confirming the view that *P. argentipes* was capable of transmitting kala azar were not quite those which would be expected in experiments on the very susceptible hamsters if *P. argentipes* was the real vector. The new facts noted above appearing to offer better opportunities of transmission further experiments with the new technique were instituted. Flies, after a preliminary feed on a kala azar patient were maintained till the tenth day on a diet of raisins and then offered a second blood meal on an experimental animal. Five hamsters and ten mice were exposed to the bites of such flies but two mice died shortly after thus leaving in all 13 animals. Of these seven, two of which were mice have been proved to have become infected. The longest period which elapsed before infection was determined was seven months in the case of one mouse. It has become evident that complete blocking is not necessary for transmission for the two mice infected had not been bitten by completely blocked flies. On the other hand one hamster upon which blocked flies alone had fed had a particularly heavy infection. Though it seems reasonable to suppose that the success of these experiments was dependent upon the inoculation of heavy doses of flagellates by blocked or partially blocked flies it still has to be remembered that there may have been an increase in virulence of the leishmania during its development in the flies fed on the raisins. So far no evidence in favour of such an increase in virulence has been obtained. It is known however that human blood serum has a lytic effect on the flagellates a fact which may account for the less intense infections in flies kept alive on blood instead of on raisins as in the experiments just described. Whether the continued blood feeding brings about also a decrease in virulence is not

known. Whatever may be the explanation of the success of the experiments, the results are those which were to be expected of the sandfly *P. argentipes* since it was discovered epidemiologically to be so closely connected with the spread of kala azar.

Though the authors speak of the final test of transmission to human beings there can hardly remain, after the experiments they have described, any vestige of doubt that *L. donovani* in India is transmitted by *P. argentipes* and that sandflies in general are vectors of leishmania throughout the world.

C M IV

I GIRAUD (P) & GAUBERT. Valeur pratique des divers procédés de recherche des leishmanies pour le diagnostic du kala-azar méditerranéen. Practical Value of Various Methods of detecting *Leishmania* for the Diagnosis of Mediterranean Kala-Azar. — *Presse Méd* 1938 Vol. 46 pp. 4-6.

II BENHAMON (E.) La recherche des leishmanies dans le diagnostic du kala-azar [The Search for Leishmanial Bodies in the Diagnosis of Kala-Azar]—*Ibid* pp 121-122 With 6 figs. [Numerous refs. Summary taken from *J. of Biol Med* 1940 Nov Vol 10 No 11 pp 831-832. Signed U F RICHARDSON]

1. Discussing the diagnosis of human leishmaniasis, the authors state that serological tests are not absolutely reliable and that the presence of the parasites should always be demonstrated. The examination of the blood, liver and skin and attempts to culture from blood or spleen all gave unsatisfactory results. Spleen puncture gave the best results but is said to cause a mortality of 1 per cent. from internal hæmorrhage. Examination of bone marrow obtained in adults from the sternum and in children by trephining the tibia near the epiphysis gave very reliable results and it is said to be simple, not painful, and free from danger. In children the puncture of lymph nodes gave results almost as reliable as those obtained by spleen puncture but in adults lymph node specimens could not always be obtained.

II Benhamon recommends sternal puncture with a trocar needle as the method of choice for routine examination for leishmanial infection. It only requires simple aseptic precautions, is reliable, free from danger to the patient and does not necessitate rest in bed. He points out that monocytosis of the lymph node juice is almost diagnostic of leishmaniasis apart from the presence of leishmanial bodies. He agrees with GIRAUD and GAUBERT (see i) as to the value of other methods of detecting infection except that he considers that skin scrapings are often an aid to diagnosis. He points out that in fact, all the methods have their uses in diagnosis and in estimating the severity of infection.

ISHII (Nobutaro) SAWADA (Toshitada) & SHIMIZU (Shigeo). Studies on Kala-Azar (Report III). (I.) Inoculation Experiment into the Fore-Chamber of the Rabbit Eye. (II.) Experimental Study on Prenatal Infection.—*Japanese J. Experim Med* 1940. June 20 Vol 18, No 3 pp 157-163 With 4 figs. on 1 plate.

In this paper further details are given of the effect of inoculating *leishmania* into the anterior chamber of the rabbit's eye. Inoculation of emulsion of infected hamster liver resulted in heavy infection chiefly of the corpus ciliare. This reached its greatest intensity two to

four weeks after inoculation. It is suggested that this response might be employed for diagnostic purposes. Similar inoculation of the flagellate stages of *L. donovani* and *L. tropica* produced slight infections.

Experiments were carried out to test the possibility of placental infection. A female mouse gave birth to four offspring 74 days after she had been infected with *L. donovani*. Three days later the four young were placed in the care of another female which was feeding five of her own. At the same time the five young were transferred to the infected mother. Later the young mice were examined and one of the young born of the infected mother was found infected. Not one of the five which had been nourished on the milk of the infected female had become infected. Further observation showed that three young of an infected mother which were examined the day after their birth were not infected. Four similarly born and examined seven days after birth showed that two were infected while not one of three, also born of an infected female was found infected when examined on the 59th day. It is thus clear that *L. donovani* is capable of passing through the placenta to the foetus. C M W

LARA (P N) Limitations of the Aldehyde Test in the Diagnosis of Kala Azar.—*Jl Indian Med Assoc* 1940 June Vol 9 No 9 pp 427-428.

The author notes that though the aldehyde test for kala azar is the one most frequently employed in the diagnosis of the disease it has to be remembered that the changes in the blood which are responsible for it are of slow development. Rarely is a positive result obtained before the disease has lasted for four months while usually a period of six months is required. Certain other diseases such as advanced tuberculosis leprosy schistosomiasis or trypanosomiasis may give confusing results. A case of malaria in a boy of 14 is mentioned his serum gave a positive aldehyde test. Kala azar was suspected and a spleen puncture performed. In place of the expected leishmania, malignant malarial parasites were found. Seven cases of kala azar in patients from 12 to 30 years of age in which the disease was over six months in duration are mentioned on account of the failure of the serum to give a positive aldehyde test. C M W

MARTINS (A França) Do diagnóstico sorológico das leishmanioses [Serological Diagnosis of Leishmaniasis]—*Ann Paulist Med e Cirurg* 1940 Apr Vol 39 No 4 pp 251-264 [24 refs.]

The article which does not contain any new observations is a general account of the various serological reactions which have been employed in the diagnosis of leishmaniasis. It is intended no doubt for the guidance of medical men in S. America who may come across suspected cases of kala azar endemic foci of which have comparatively recently been brought to light. C M W

GATTO (Ignazio) Ricerche sul ricambio emoglobinico nella leishmaniosi viscerale [Haemoglobin Variation in Visceral Leishmaniasis].—*Settimana Med* Palermo (formerly Riv Sanitaria Siciliana) 1940 Feb 9 Vol 28 No 6 pp 142, 145-8 [30 refs.]

An investigation of eight cases of infantile kala azar has shown that the degree of bilirubinaemia and the haemolytic index were in seven

of the cases within the normal limits, both at the commencement and at the completion of a course of antimony treatment. The conclusion can be drawn that the anaemia of kala azar is not due to an increase in the haemolytic process but to defects in blood production due to changes in the bone marrow

C M W

ADAMS (A R D) & YORKE (Warrington) *Studies in Chemotherapy* XXV—A Second Case of Indian Kala Azar treated with 4,4-Diamidino Stilbene.—*Ann Trop Med & Parasit.* 1940 Sept. 28 Vol 34 No 2. pp 173-174

In a previous paper [this *Bulletin* 1940 Vol 37 p 775] the authors have described the successful treatment of a case of kala azar with the drug. The present paper gives an account of the treatment of a second case in a Hindoo seaman, aged 28 from Calcutta. The drug was given intravenously each day for 8 days in a dose of about 1 mgm. per kilo of body-weight the total amount administered being 400 mgm. The only immediate effect was an increase in the daily excursions of the temperature which fluctuated between the normal and 104°F. After 4 days the temperature fell, till on the 7th day it remained at normal. The spleen, which was enlarged to below the umbilicus, quickly became reduced in size. The patient left hospital 6 weeks after the commencement of treatment apparently cured, attempts to discover parasites by spleen and sternal puncture ten days before his discharge having failed

C M W

KIRK (R) & SATTI (Mohammed Hamad) *Notes on Some Cases of Sudan Kala Azar treated with 4,4-Diamidino Stilbene.*—*Ann Trop Med & Parasit.* 1940 Sept. 26. Vol. 34 No 2. pp. 83-92 [10 refs.]

In this paper the authors describe the treatment of a number of cases of kala azar in the Sudan with diamidino stilbene. Eight of these are considered in detail, the case histories being given. There were two deaths in patients who were moribund when treatment was commenced, and six recoveries in cases which have shown no signs of relapse during four months observation. Twenty other cases have also been treated with the drug but the length of control has been short. Of these two have died, three were still in hospital when the paper was written while the remainder had been discharged as apparently cured. The total dosage of the drug to bring about cure varies from case to case. Thus one case was cured by 975 mgm given in 24 injections during a period of five weeks, while another required 4.4 gm. given in 70 injections during six months. It was thought that the daily dose was more effective than dosage on alternate days. The standard solution for intravenous injection was made by dissolving 100 mgm. in 10 cc. of distilled water. It is admitted that the best scheme of treatment has yet to be worked out but it is already evident that, just as is the case with antimony treatment, there is marked individual variation as regards the quantity of drug required to bring about a cure. In the doses used, 1 to 2.6 mgm per kilo of bodyweight, toxic symptoms were negligible, but it was noted that at the commencement of a course of treatment there was not infrequently an exacerbation of the signs and symptoms of the disease. As occurs sometimes during antimony treatment, punctate and nodular skin

lesions in which leishmania may be found are apt to appear during a course of diamidino stilbene. In assessing the results of treatment no opinion is expressed as to whether these are better than those which would be expected from antimony treatment. It is noted that the Sudan cases are notoriously difficult to treat owing to the frequent occurrence of such complications as intractable diarrhoea, haemorrhages, cancrum oris and lobar pneumonia, quite apart from concomitant infections of which helminthiasis, malaria, amoebic and bacillary dysentery are the commonest.

C M W

KIRK (R.) & MACDONALD (D. R.) An Unusual Case of Leishmaniasis treated with 4,4'-Diamidino Diphenoxy Pentane.—*Ann Trop Med & Parasit* 1940 Sept 26 Vol 34 No 2. pp 131-134 With 2 figs on 1 plate

A young native in the Sudan 24 years of age was treated for kala azar with neostibosan. Response was more rapid than is usual with cases of this disease in the Sudan so that the patient was discharged as cured from the Omdurman hospital on the 45th day of observation. He returned 13 days later suffering from bilateral anterior tibial paralysis with double foot-drop. There was a very conspicuous nodular depigmented eruption on the face and a minutely punctate rash over the remainder of the body. Rhinoscopy revealed a large flat ulcer on the nasal septum. Smears from the ulcer and a nodule on the face revealed leishmania. There was no fever and the patient felt quite well. The spleen was still palpable. After 49 days rest in hospital, during which the neuritis disappeared treatment with the drug named in the title of the paper was commenced. It was administered intravenously on alternate days in 10 cc. of distilled water. Ten doses of 80 mgm and 13 doses of 100 mgm. were given a total of 21 gm. There were no toxic symptoms. The spleen decreased in size and the cutaneous and nasal lesions subsided. A month after discharge from hospital the patient was again seen when the spleen was no longer palpable. Smears from the skin and inside of the nose failed to reveal leishmania.

Discussing the case the authors note the resemblance of the cutaneous eruption after successful treatment of a visceral infection to post kala azar dermal leishmaniasis of India. The rapid disappearance of the skin lesions after the treatment is however a point of difference. The nasal mucosal lesion suggests espundia cases of which have been recorded for the Sudan. The case described is the first in which visceral, cutaneous and mucosal leishmaniasis have been found in one individual.

C M W

KIRK (R.) & SATI (Mohammed Hamad) Studies in Leishmaniasis in the Anglo-Egyptian Sudan. IV A Punctate Rash in Treated Cases.—*Trans Roy Soc Trop Med & Hyg* 1940 Aug 16 Vol. 34 No 2. pp 213-216 With 4 figs on 1 plate.

In an earlier publication from the Sudan KIRK and DREW [this *Bulletin* 1938 Vol 35 p 877] mentioned a finely punctate eruption which appeared during the course of antimony treatment of cases of kala azar in that country. In the present paper a fuller account of this rash is given. It occurs in about 20 per cent of cases, usually after the first or during a second course of treatment when fifteen to thirty

doses of neostibosan have been given. It appears only in cases which are reacting favourably to the treatment and is thus of some prognostic significance. It is first seen on the face on the forehead or malar region as a minute punctate rash. It may be restricted to these regions but more usually the whole face and neck become involved. In the coarser forms the puncta are readily palpable and might be described as papules. In some cases sudamina accompany the rash while in others the individual puncta are difficult to distinguish, there being an appearance of xeroderma or mild ichthyosis. Rarely the rash extends to other parts of the body. There is no tendency to ulceration and subjective symptoms are lacking. Unlike the post kala azar dermal leishmaniasis of India which usually appears a year or more after treatment is completed, the eruption under discussion tends to disappear spontaneously within a few months after discharge from hospital. The view that the rash is the direct result of the antimony is disproved by the observation that it may occur during treatment with 4-4'-diamidino stilbene. Careful examination has shown the presence of leishmania in small numbers in scrapings from the papules but as these parasites may also be demonstrated in scrapings of apparently healthy skin of patients who have had no treatment their presence in the lesions has little significance. It has been noted by AUGIER and FAURE BRAC [this *Bulletin* 1935 Vol. 32, p. 490] that the cutaneous lesions which commonly occur in dogs suffering from kala azar become aggravated during antimony treatment and they consider this phenomenon to be analogous to the Herxheimer reaction. It may be that the appearance of the eruption in the Sudan cases of kala azar has a similar explanation.

C. M. H.

WANG (C. W.) A Histopathological Study of the Spleen of Kala Azar Hamsters undergoing Treatment with Neostibosan.—*Chinese Med J.* 1940 Mar Supp 3 pp 564-573 With 14 figs. on 7 plates.

A series of hamsters was infected by intraperitoneal inoculation of spleen emulsion of an infected hamster. Three months later by biopsy a portion of spleen of all the animals was removed for study by smear and section. Fourteen to 18 days later the surviving hamsters were given neostibosan treatment in doses of 400 mgm. per kilo. of body weight administered subcutaneously three times a week till a total of 15 gm. per kilo had been given. From time to time pairs of hamsters were killed and the spleens removed for smear and section preparations. All the hamsters which survived the operation remained in apparently good health in spite of their infections and treatment. The spleen showed definite decrease in size from the thirteenth day onwards. Histopathologically the changes in the spleen during treatment of 32 hamsters may be divided into three stages. The first is characterized by the proliferation of plasma cells and lymphocytes. As at this stage there is no reduction in the number and size of the parasite-containing cells, the spleen is presumably increased in size. In the second stage one of resolution, there is degeneration of the host cells and disappearance of the parasites. During this process the parasites seem to disappear before the degeneration of the host cells, the cytoplasm of which seems to degenerate first. It appears likely that under treatment the cytoplasm of the reticulo-endothelial cells no longer serves as a favourable medium for the

survival of parasites. The degeneration of the cells follows one of two courses. They degenerate and disintegrate or they contract in size and become atrophic. There is no evidence of phagocytosis. The third and final stage is that of repair the end result following one or other of the following lines (1) lymphocytic hyperplasia (2) thickening of trabeculae (3) return to normal architecture (4) fibroplastic proliferation. Though hamsters were examined up to 88 days after treatment had commenced, all the more important and characteristic changes were observed during the first three weeks

C M II

HALAWANI (A) On the Distribution of Oriental Sore in Egypt.—*Jl Egyptian Med Assoc* 1940 Apr Vol 23 No 4 pp 192-198 With 2 figs.

The author traces the development in knowledge regarding the occurrence of oriental sore in Egypt up to the discovery by KHALIL Bey in 1933 of an endemic focus at Helia to the East of the Nile Delta near the town of Zagang. The examination of suspected cases in the Skin Department of the Kasr El Ain hospital in Cairo has shown that other endemic foci probably exist. Cases positive for *Leishmania tropica* were from the following localities. Southag and the neighbouring village of El Battack. Tal El Zaka. Markaz Tema. Beni Mohamed. Markaz Abnoub Assiut Province. Rosetta. Imam El Shafel, Cairo

C M II

MARCHIONINI (Alfred) Zur Klinik der Hautleishmaniose. Typische und atypische Erscheinungsformen [Typical and Atypical Forms of Oriental Sore].—*Türkische Ztschr f Hyg u Experim Biol* Ankara. 1940 Vol. 2. No 1 pp 45-57 With 12 figs. [Turkish version pp 39-44]

The author gives an account of his experiences with oriental sore some 200 cases of which he has encountered since 1938 at the hospital skin clinic at Ankara. Most of the cases of this disease in Turkey come from Central or Eastern Anatolia. The majority of the cases show characteristic sores but a number develop atypical lesions as a result of secondary bacterial infections. Thus cases resembling syphilis, tuberculosis, erysipelas and pyogenic skin infections are encountered. Where secondary bacterial invasion occurs local antibacterial treatment by antiseptics is indicated, while protosil may be given internally. At the same time anti leishmania remedies such as neostibosan, foudin or tartar emetic, are employed. In some cases to bring about healing X ray treatment or electrocoagulation have been used.

C M II

ALAN (Vefik Vassaf) Ueber Leishmaniose in der Türkei. [Leishmaniasis in Turkey].—*Türkische Ztschr f Hyg u Experim Biol* Ankara 1940 Vol. 2. No 1 pp 67-71 With 5 figs. [Turkish version pp 58-66]

A short account of leishmania infections and the life history of the causative organism. No new information is given except in the statement that certain observers have successfully treated oriental sore with atabrin.

C M II

PESTANA (Bruno R.) PESSÔA (S. B.) & CORRÊA (Aniceto) Notas sobre a leishmaniose no município de Marília, estado de São Paulo (Alta Paulista). [Leishmaniasis at Marília, São Paulo.]—*Arquivos de Hig. e S. de Pública* 1940 Jan Vol. 5 No. 8 pp 15-18 English summary (7 lines)

VILLELA (Francisco) Dados estatísticos sobre a leishmaniose das mucosas em Araçatuba, estado de São Paulo. [Statistics of Mucocutaneous Leishmaniasis in Araçatuba, São Paulo.]—*Ibid* pp 21-24 English summary (6 lines).

PESTANA (Bruno Rangel) & PESSÔA (S. B.) Leishmaniose tegumentar autóctona no município de São Paulo. [Endemic Cutaneous Leishmaniasis in the Town of São Paulo.]—*Ibid* pp. 27-33 With 3 refs. English summary (6 lines).

PESSÔA (S. B.) & PESTANA (B. Rangel) Sobre a disseminação da leishmaniose tegumentar no estado de São Paulo. (Resultado d'um inquérito realizado nos "Centros de Saúde" do Interior) Dissemination of Cutaneous Leishmaniasis in the State of São Paulo. —*Ibid* pp. 37-46 With 2 maps. English summary

— & — Leishmaniose tegumentar urbana. [Urban Cutaneous Leishmaniasis. —*Ibid* pp. 49-55. With 1 map. [11 refs.] English summary

This series of papers is concerned with the epidemiology of mucocutaneous and cutaneous leishmaniasis in the State of São Paulo. The area covered can be divided into four sections according to the incidence of the disease. These are zones of high, moderate and low endemicity and a zone which is free from the disease. The distribution of the infection according to age, sex, nationality and residence has shown that intimate contact with wooded country is not always a necessary condition for acquiring it. A special study of rural and urban districts within the zone of high endemicity has shown that only in the one town, Araçatuba, were any considerable number of cases met with. It is admitted that infections occur occasionally in this town, owing to the density of the transmitting agents (species of *Phlebotomus*) in its periphery but investigators have shown that the majority of the cases have come from the rural districts. On the whole leishmaniasis in the State of São Paulo cannot be regarded as a problem of urban hygiene. C. V. II

GERMAN (Quentin M.) A Study of Four Peruvian Strains of *Leishmania brasiliensis*. Paper read at 16th Ann. Meeting of American Society of Parasitologists. Abstract taken from *Supp. to J. Parasitol.* 1940 Dec. Vol. 26. No. 6. pp. 22-23.]

Sixty-nine cases of cutaneous and nine cases of mucocutaneous leishmaniasis commonly called *ulcer* and *espundia* respectively were studied in Peru. Thirty-nine cases of *ulcer* were suitable for attempts to discover and isolate the causative organism. Stained films from 5 patients and cultures from 4 were positive for *Leishmania brasiliensis*. Scrapings of cutaneous lesions were inoculated directly into white mice and one dog on two occasions. No infections resulted. Swiss mice, dogs and monkeys (*Macaca mulatta*) were given subcutaneous or intraperitoneal inoculations from cultures. No gross lesion was produced or found at autopsy of the mice but positive cultures of *Leishmania* were recovered from the spleen of three mice one month after

intraperitoneal inoculation. One dog developed typical *ulc* on the nose and ear from which organisms were recovered in stained films and cultures. A biopsy specimen from the infected dog's nose produced a lesion when implanted in the nose of a second dog. The relative infectivity of *L. tropica* (1 strain isolated in Algiers in 1928) and *L. brasiliensis* (4 strains) for the chorio-allantoic fluid of the developing chick embryo was determined. The fluid of 5-9 day embryos was easily infected with *L. tropica* and it contained great numbers of actively motile organisms at the end of 3-5 days. No invasion of the membranes and the blood stream occurred. Twenty-six serial passages were made during a period of four months. Initial inoculation of *L. brasiliensis* under identical conditions produced no massive infection but only a morphological change, loss of motility and a survival of the original organisms to the second passage. No tissue or blood stream invasion was detected.

AMOEBIASIS AND OTHER FORMS OF DYSENTERY

PRÉCIS OF ABSTRACTS IN THIS SECTION

HOWELL and KNOLL (p 267) point out that amoebiasis in the young in the United States is by no means rare. They have found infection in over 3 per cent. of children and in 5.2 per cent. of adults examined. They describe the symptoms and treatment given. TSUCHIYA and JEAN (p 267) found *E. histolytica* in 12 of 562 students at St. Louis, Missouri. None gave a history of symptoms attributable to the infection. BARCELOS (p 267) reports an outbreak of amoebic dysentery in the island of Carvalho.

By experiments with dogs TOBIE (p 268) has shown that strains of *E. histolytica* from carriers are pathogenic and argues that the so-called healthy human carriers should be regarded as clinically infected and should be treated. BORLAND (p 268) holds the same opinion and does not agree with the view held by some workers that *E. histolytica* may live in man as a harmless commensal.

BERCOVITZ (p 269) has shown that in autopsy material cells found in the bowel contents are the same as those found in scrapings of the mucosa from the same areas. In the bowel discharges of patients suffering from a variety of pathological conditions there may be large cells which may be confused with *E. histolytica*. Polymorphonuclear leucocytes and epithelial cells may also be found.

MATEER *et al* (p 270) give in detail their method of treating amoebiasis by oral administration of carbarsone and by enemata of yatren. This gave 97 per cent. of cures in acute, chronic and latent cases.

CRAIG (p 271) writes of the value of diodoquine (which is described) not only in treatment but also as a temporary prophylactic for those passing through areas where amoebiasis is endemic. It can be taken in large doses over a considerable period without ill effects.

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HUMMEL (p. 272) reports a patient with an amoebic granuloma of the rectum and a balantidial infection of the sigmoid. Treatment which included diodoquin, was successful against both conditions.

GHOSH (p. 272) states that a number of skin infections intractable to usual treatment cleared up when the finding of amoebae in the stools led to the administration of emetine or stovarsol.

In *Nature* (p. 272) is given a note on new official standard for the alkaloidal content of ipecacuanha.

VAIDY (p. 273) reports two cases of poisoning by kurchi bark in children.

SILVERMAN and ST. MARTIN (p. 273) give clinical details of patients with liver abscess.

MCGRATH *et al.* (p. 274) discuss the mechanism of fat absorption in relation to a patient who had symptoms of steatorrhea. The duodenal contents contained vast numbers of *Giardia intestinalis* the normal mucous membrane pattern, seen at X-ray was almost obliterated and at post mortem it was found that the villi and crypts were practically absent the villi and crypts being almost denuded of surface epithelium. There was no evidence that *Giardia* had penetrated the villi and crypts, but the authors ascribe the symptoms of idiopathic steatorrhea to injury of the epithelial lining of the small intestine.

VOTRINA (p. 275) writes of the efficiency of atehin in the treatment of giardiasis especially when the clinical manifestations are those of enterocolitis in which case there is a general improvement in the condition of the patient. If the symptoms are those of cholecystitis there is no immediate improvement. LOVE and TAYLOR (p. 276) record success in the treatment of infections with *G. intestinalis* by means of atehin.

NELSON (p. 276) has been able to cultivate *Balantidium coli* in a medium of one part of contents of the caecum of the pig and nine parts of Ringer's solution.

Bacillary Dysentery.—OLIVAS (p. 277) reports on bacillary dysentery in children in Peiping. The incidence was highest in summer and in the poor and ill-nourished. Clinical details are given. The commonest complication was bronchopneumonia, but thrombocytopenic purpura was seen in some. In treatment emphasis is laid on the administration of saline subcutaneously or intraperitoneally to combat dehydration, or of glucose intravenously and on blood transfusion. Polyvalent antidyenteric serum is of doubtful utility.

In reporting on bacillary dysentery in the German army during the campaign in Poland, OTTO (p. 278) points out that epidemics were noticeably associated with plagues of flies and that the disease was spread in hospitals by direct contact. He describes abortive, mild, moderate and severe types in considerable detail and gives a long list of complications. Infection was principally due to Flemer bacilli. He gives details of treatment which was largely concerned with fluid and salt replacement and with diet, but there is no mention of oral saline treatment and the sulphonamides were not used. Serum was valuable if given early.

REITLER and MARBERG (p. 280) report remarkably good results in the treatment of bacillary dysentery with sulphapyridine alone. Details of the causative organisms and of the progress under treatment.

HOWELL (Katharine M) & KNOLL (Elta W) *Amoebiasis in Infants and in Children.*—*Amer Jl Dis Children* 1941 Jan. Vol. 61 No 1 pp 54-63 [16 refs]

There is a widely-held idea that amoebiasis in the young is very rare except in the tropics. This is erroneous as OSLER and others in the United States have shown. H F HARRIS stated that one child is infected to every ten adults who acquire the disease. The authors have examined the stools of 408 children at their hospital during the three years 1937-39 and found 13 infected. During the same period 55 were found among 1 044 adults examined (5.2 per cent). Between 1929 and 1939 inclusive 18 children were found with amoebiasis. 12 were boys 6 were girls. Their ages ranged between 8 months and 13 years. Some had acute abdominal pain nausea and fever simulating acute appendicitis others were subject to colitis or intestinal disturbance at intervals over a period of years others again had no localizing symptoms and were discovered accidentally among those in hospital for other diseases such as pseudohypertrophic muscular dystrophy inguinal hernia enlarged tonsils and adenoids.

Under treatment the symptoms of amoebiasis rapidly cleared up two were given emetine hydrochloride the others carbarsone. The authors do not agree that cysts of *E. histolytica* in stools indicate the carrier state with the host parasite equilibrium established, and that the presence of trophozoites indicates acute amoebiasis for in some cases cysts would be found one day a few days later they might see precysts and trophozoites while all forms might be seen on another occasion. Reference is made to the stools of 105 children examined at a Chicago orphanage among whom there were five with *E. histolytica* (4.8 per cent as compared with 3.18 at the Sarah Morris Hospital) thus bearing out the view that the incidence of amoebiasis is greater in institutions than among the general public. H H S

TSUCHIYA (H) & JEAN (J Ted) *The Incidence of Intestinal Protozoa among Freshman Medical and Dental Students with Especial Reference to Amoebiasis.*—*Amer Jl Trop Med* 1940 Nov Vol. 20 No 6 pp 803-808

An examination of 562 medical and dental students at the School of Medicine at Saint Louis Missouri, has revealed an *Entamoeba histolytica* infection in 12. Of these 6 were in students from Missouri 2 from Illinois and one each from New York, New Jersey Montana and Utah. The number of students from some of the States was however small so that little significance can be attached to some of the negative results. Other intestinal protozoa were also found—with the exception of *Dientamoeba fragilis*. Not one of those found to harbour *E. histolytica* revealed any history of dysentery or symptoms attributable to the infection. The report once again produces evidence that amoebiasis is cosmopolitan in distribution. C M Wanyon

BARCELOS (Vasco de Freitas) *Um surto de disenteria amebiana na Ilha do Carvalho em Neves.* [An Outbreak of Amoebic Dysentery in the Isle of Carvalho Neves].—*Arquivos de Higiene* Rio de Janeiro 1940 June Vol 10 No 1 pp 109-126 With 5 figs. & 1 chart.

This outbreak involved 30 among 102 inhabitants (according to two tables 30 cases in another 31 in the letterpress 34 are mentioned

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and the inhabitants, in one table total 102, in another they are given as 115 by a wrong addition which really amounts to 125] and seems to have been due to a combination of causes. A carrier or cyst passer was found who came into fairly intimate contact with the others, the sanitation left much to be desired, the water was unprotected, effluent passed to that part of the shore whence people bathed, flies were abundant and so forth. The first case was observed on December 27th 1938, the only one that week, thereafter in successive weeks were 4 11 and 16 notified respectively. Treatment of the patients and ordinary sanitary precautions soon put an end to the outbreak.

H H S

TOMIE (John E.) Pathogenicity of "Carrier" Strains of *Entamoeba histolytica* in the Experimental Dog.—*Proc. Soc. Exper. Biol. & Med.* 1940 Vol. 45 No. 2 pp 691-693.

This investigation had in view the experimental determination of the pathogenicity or non-pathogenicity of the "healthy carrier" strains of *E. histolytica* i.e. strains from persons harbouring the amoeba but showing no clinical symptoms. The strains were obtained from a group of orphan children who had shown no symptoms of dysentery and not even diarrhoea. The cysts or trophozoites were obtained from the faeces and dogs were inoculated intragastrically with cysts or intracaeally with trophozoites isolated in culture. Twenty six dogs were inoculated with 16 different "carrier" strains and all became infected and showed clinical signs and symptoms of the intestinal lesions of dysentery such as extensive denudation of the mucosa, ragged, round and slit-like ulcers, or typical pin-point lesions. In other words all the carrier strains were pathogenic to dogs, all the conditions in the dog are comparable with those in man, all persons harbouring the amoeba have some lesions in the bowel and there is, *scarcely* stricto no such thing as a "healthy carrier condition in man" carrier strains of the amoeba are pathogenic and the so-called healthy human carriers should be regarded as clinically infected and be treated.

H H S

BORLAND (James L.) Factors in the Diagnosis of Intestinal Protozoa in Man and in the Interpretation of the Findings.—*Amer. J. Digestive Diseases* 1940 Oct Vol. 7 No. 10. pp. 401-408. With 1 graph. [21 refs.]

Writing from Florida the author discusses the difficulties in diagnosis of intestinal protozoal infections and in arriving at decisions regarding the pathogenicity of those found to be present. As regards *Entamoeba histolytica* the opinion has been growing that this amoeba may at any time live as a harmless commensal in the intestine but the author holds that it has not yet been demonstrated that any person infected has been free from intestinal lesions. The precautions which have to be taken to ensure accurate diagnosis, such as the supply to the laboratory of material suitable for examination, are emphasized. It is particularly noted that infected individuals do not of necessity pass protozoa in the stools every day so that conclusions based on a single negative examination are apt to be misleading. When every precaution has been taken it still has to be recognized that "reports

coming from a technician who lacks long and specific protozoological training regardless of his competency in other microscopic fields, had best be discarded and conclusions drawn from clinical observations alone.

C M W

- BERCOVITZ (Z) **Studies in Cellular Exudates of Bowel Discharges**
 I. Control Observations in 1 123 Patients, 7 Autopsies, and 3 Dog Experiments.—*Jl Lab & Clin Med* 1940 May Vol 25 No 8 pp 788-795 With 2 figs. [12 refs.]
 — **Studies in the Cellular Exudates of the Bowel Discharges**
 II. The Differential Diagnosis of Amoebiasis Types of Cells found in Bowel Discharges of Patients with Bowel Complaints.—*Amer Jl Digestive Diseases* 1940 Mar Vol. 7 No 3 pp 83-101 With 17 figs

In the first paper the author has made a thorough attempt to weigh up the significance from a diagnostic viewpoint of cellular exudates in bowel discharges. After reviewing the earlier work mainly performed during the last war on this subject he concludes that the suggestion of WFNOM & O CONNOR on the relationship of cellular exudates to ulcerative colitis and other types of bowel complaints has received ample confirmation.

These special studies which have been carried out during the past four years have established the fact that whenever pathogenic changes take place in the bowel mucosa various types of cell will be found in the discharge and conversely when no cells are found in the bowel discharge no pathological condition is present. As a preliminary a series of observations was undertaken to determine whether a cellular exudate could be found in the discharge of a patient whose bowel functions were reported as normal, and, in order to establish a reliable check on these observations examinations were made in a series of autopsies and also upon a group of 1 123 patients selected at random under conditions where no complaints were made on the functions of the gastro-intestinal tract.

The specimens examined consisted firstly of normally passed stool and secondly of the diarrhoeal discharge following dosage with Epsom salts. So that freshly passed warm specimens could be studied patients were asked to come to the laboratory to evacuate their bowels after administration of the salts. The human autopsy material including bowel contents and scrapings from several locations along the gastro-intestinal tract was examined and in each case scrapings from the bowel wall were taken from the same place as the bowel contents and were fixed in 10 per cent. formalin. The investigations were directed to ascertain whether or not the cells found in the contents corresponded exactly with those found in the scrapings from the same area.

In order to deal satisfactorily with the problems raised by possible post mortem degeneration three dogs were killed by intravenous and lethal doses of amytal. The abdomens were opened immediately and their bowels were studied before any post-mortem changes could possibly take place.

Out of an examination of 2,158 specimens of normal and diarrhoeic (Epsom salts) stools only 11 were positive for cells no further investigation of their implication was carried out. From a study of the autopsy material it was discovered that cells found in the bowel

contents were the same as those found in scrapings from the same areas. It could therefore be affirmed that these cells were the result of post-mortem degeneration and these findings were in complete agreement with those of SCHMIDT & STRASSBURGER in their monograph in 1910 (*Die Fäzes des Menschen*).

The second paper elaborates this study in relation to pathological discharges from the bowel. Bercovitz has applied the method of colonic irrigation—a tepid colonic irrigation with normal saline is continued until the return flow is entirely clear of faecal matter. The terminal mucus is obtained for examination. The patient should be given a series of three such irrigations—the first two being discarded. He prepared 179 patients in this manner and altogether 248 specimens were studied. *Entamoeba histolytica* was found in 14 which constituted 7.7 per cent. of the total number.

The advantage of studying this type of specimen lies in the fact that, even though a cellular exudate may be present the amoebae can be readily visualized and identified. These amoebae when freshly passed exhibit all their characteristics and further details can be brought out by staining with Lugol's solution.

Bowel discharges were examined from a series of 200 patients suffering from a variety of pathological bowel conditions and the types of cells observed were particularized. Large cells with prominent nuclei 20–30 μ and even in some cases 150 μ , are apt to be confused with *E. histolytica* when stained with Delafield's haematoxylin and even the nuclei appear more solid and do not exhibit the same characteristics as in fresh wet-fixed specimens. [These are evidently the cells described by the reviewer and others. See this *Bulletin* 1918, Vol. 12, p. 427.] Polymorphonuclear leucocytes are readily seen, and in fresh unstained preparations the nuclei appear as open rings with usually two or three in a single cell which may be confused with the cysts of *E. histolytica*. Epithelial cells with oval or rounded nuclei, solid or ringed, are frequently found and can be well demonstrated with methylene blue. [These papers are illustrated by a series of excellent photomicrographs which, unfortunately, do not bring out the minor details exemplified in drawings. These include a series from chronic ulcerative colitis, in which the cell picture is similar to that of acute bacillary dysentery but no explanations are forthcoming as to any means of differentiating these two dissimilar conditions.]

P. Manson-Bahr

MAYER (John G.) BALTZ (James L.) MARION (Donald F.) & HOLLANDS (Robert A.) The Treatment of Amebiasis by a Combined Method—Statistical End Results. (Oral Administration of Carbarsone and Retention of Enemata of Chinlofon.)—*Amer. J. Digestive Diseases* 1940. Apr. Vol. 7. No. 4. pp. 154–159.

The authors have observed 104 patients with uncomplicated amoebiasis treated by a combination of carbarsone and yatren. The former was given orally in doses of 0.25 gm. twice daily for ten days and the latter as a retention enema on alternate mornings for the same period, the yatren being preceded by a cleansing saline enema of 750 cc. They give in detail the ritual of the enema. On enema days no breakfast is allowed, but at 8 a.m. the patient has the wash-out. At 9 a.m. 250 cc. of a 2.5 per cent. aqueous solution of yatren are run in with the patient in the genu-pectoral position. The patient remains

in this position for five minutes so that some at least of the yaten reaches the ascending colon. He then drops on the right side and stays thus for half an hour (to retain the fluid in the caecum and ascending colon) then on to the back for half an hour next on to the left side for the same time then from 10.35 a.m. to 1 p.m. on the back again. Patients were kept under observation for three years or more. Stools were obtained by warm saline enema or by a saline cathartic weekly for four weeks after completion of the course of treatment then monthly for five months and thereafter every six months.

The 104 cases are divided into five groups: (1) Those with acute amoebic dysentery 20 in number. (2) Chronic relapsing dysentery (19) with history of previous acute or subacute attacks. These two groups were therefore suffering from acute amoebiasis. (3) Carrier or latent cases (25) without any colon symptoms. (4) Latent cases with chronic irritable colons. (5) Another type of latent amoebiasis with small pin point ulcers in the colon. [The reviewer cannot follow the authors in their statement 'The 65 cases in the last three subgroups were cases of clinically latent amoebiasis so far good but' In this latent group of 65 cases the 40 cases in the last two clinical subgroups had colonic symptoms not of amoebic etiology. If they were cases of latent amoebiasis with irritable or ulcerated colon by what criteria is the decision reached that the symptoms were not of amoebic aetiology?] Three of the 104 showed a recurrence but this was cured by giving vioform. No patient showed any unfavourable reaction. The drugs hitherto used alone have not been credited with more than a 90 per cent success of the 104 dealt with all cleared at once and were free of amoebae except the three already mentioned which relapsed in other words the combined drugs gave 101 cures out of 104 or 97 per cent.

H H S

CRAIG (Charles F.) *The Medicinal Prophylaxis of Amebiasis.*—*Amer J Trop Med* 1940 Nov Vol. 20 No 6 pp 799-801

It is too much to expect that drugs found useful in the treatment of amoebiasis could be taken constantly to protect those living in an endemic district but their temporary use to safeguard those passing through such a district or making a short stay is a different matter. Prophylaxis by avoidance of all uncooked food and unboiled water however desirable theoretically is not always feasible. Three drugs are worth considering: carbarsone, chiniofon and diodoquin. The first though an efficient amoebicide is an arsenical preparation and too toxic to be taken except under medical supervision. The second though less toxic in some persons causes a diarrhoea the third can be taken in large doses over a considerable period without ill effects.

Diodoquin (5,7-diiodo-8-hydroxyquinoline) is a compound in which the sodium sulfonate radical of chiniofon has been replaced with a second iodine atom forming a double iodine compound. Chiniofon is a mixture of 7-iodo-8-hydroxyquinoline-5-sulphonic acid 4 parts by weight and sodium bicarbonate 1 part. It contains 28.2 to 29.6 per cent of iodine whereas diodoquin contains 63.9 per cent. of iodine and it is on this that its amoebicidal properties depend. It is put up in tablets of 0.21 gm. (3.2 grains) and for treatment of infection 7-10 tablets are taken daily the smaller dose for latent (cyst passers) and mild cases. For prophylaxis this is the dosage recommended: two tablets after breakfast and lunch three after dinner daily (for adults).

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for 20 days. If the stay in the endemic region is less than 20 days it is nevertheless advisable, says Professor Craig, to complete the course. If the person has to stay longer the course may be repeated after a week's interval.

HUMMEL (H G) Amoebic Granuloma of the Rectum and Balantidiasis in the Same Patient.—*Amer J Trop Dis Hyg* 1940 Apr Vol 7 No 4 pp 178-179 [17 refs]

Amoebic granuloma of the large intestine though not common, has been reported sufficiently often for the tropical practitioner to be on his guard and not to jump to the conclusion that the owner is suffering from a malignant growth. The patient, whose case is here recorded, was a man of 49 years who had suffered from chronic diarrhoea (10-20 stools in 24 hours) and had lost 40 lb in weight in the twenty years of his complaint. He had tenderness over the descending colon. blood examination gave r.b.c.s. 3 408 000 white cells 9 400 per cmm., haemoglobin 77 per cent colour index 1.1. Sigmoidoscopy revealed 7 inches from the anus a greyish-pink granular growth the size of a large walnut edges nodular and with necrotic areas on the surface. There were discrete punched out ulcers in the sigmoid. Scrapings from the former showed many *E. histolytica* and from the latter *Balantidium coli*. Treatment consisted of a high caloric, low residue diet and 500 units of vitamin B and diodoquin (a di-iodohydroxy quinoline compound containing 84 per cent iodine) 0.21 gm. (ten tablets) daily for ten days. When seen again after this interval the patient had gained 10 lb in weight stools were reduced to two daily abdominal pain had disappeared, sigmoidoscopy revealed a normal bowel, no ulcers or granuloma, but an irregular scar 4 cm in diameter at the site of the former tumour. The author states that he has used diodoquin in forty-one consecutive cases of amoebiasis with excellent results and it seems to have equally gratifying results on amoebic granuloma and balantidiasis.

GHOSH (H) Inhibitory Influence of Chronic Amoebiasis on Immunity against Bacterial Infection.—*J Indian Med Assoc* 1940 Aug Vol 9 No 11 p 541

The author states he has met with several cases of local skin affection such as scabies, staphylococcal eczema, streptococcal pustules, all of which have resisted the usual methods of treatment and the latter two the use of vaccines but which cleared up when the finding of amoebae in vegetative or cystic form, in the stools led to the administration of emetine and stovarsol.

On these grounds it is held that "amoebiasis plays a great rôle in the chronicity of bacterial skin infection by exerting an inhibitory influence on the natural formation of antibodies."

NATURE. 1940 July 27 Vol. 148. No. 3691 p 125.—The B.P. Standard for Ipecacuanha. [News and Views]

In this note attention is drawn to a notice in the *Gazette* of July 5th 1940 in which is announced an alteration in the standard for the alkaloidal content of ipecacuanha. The B.P. 1932 requires the root to contain not less than 2 per cent. of the total alkaloids calculated as

emetine of which not less than two-thirds consists of non phenolic alkaloids calculated as emetine. The change now made is the substitution of three-fifths for two-thirds. This slight change will have a marked effect on the availability of the drug since the 1932 test excluded large importations from Bahia and Minas Geraes which will now to a great extent conform to the new B.P. standard. A reduction in cost is to be expected and the new regulation will probably be of importance in regard to supplies of emetine C II

NAIDU (S Rajagopal) *Holarrhena antidysenterica* Wall.—Madras Ann. Rep. Chemical Examiners Department for Year 1939 pp 3-4

The author reports poisoning by kurchi (or conessi) bark given as a purgative to two children. Death was apparently due to heart failure and extracts of alkaloids were obtained from the viscera and from specimens of the plant used *Holarrhena antidysenterica*. These alkaloids gave the same results with various chemical tests.

Recent clinical experiences have led to the adoption of this plant as a remedy in dysentery but its alkaloids are known to be poisonous. Indiscriminate use therefore is highly dangerous C IV

SILVERMAN (Daniel N.) & ST MARTIN (Roy J.) Early Diagnosis and Treatment of Amebic Abscess of the Liver—*New Orleans Med. & Surg. J.* 1940 Aug. Vol. 93 No 2. pp 90-92

For treatment of amoebic hepatitis and hepatic abscess to be effective without operation, early diagnosis is all important. Often and particularly among those physicians who have not had tropical experience the diagnosis is excluded on the grounds that the patient does not give a history of previous dysentery. [We must remember also that amoebiasis of the intestine may be associated with symptoms varied and vague see MAYER this *Bulletin* 1940 Vol. 37 p 734]

The authors give details of four patients with liver abscess, three of them being treated medically, the fourth [a doubtful case in the reviewer's opinion] died after operation. The first was a man of 51 years who developed an enlargement of the liver with leucocytosis of 32 000 per cmm. during an attack of dysentery. Improvement followed the use of emetine. [Presumably a history of a previous attack of dysentery was enquired into but no statement to that effect is made. Incidentally the stool examination was negative. The diagnosis in this case seems to have been made on the effects of emetine.] The second was a man of 42 years who received treatment for amoebic dysentery (with stovarsol). A fortnight after the stools were found free from *E. histolytica* he developed signs of liver abscess which improved with emetine injections. The third was a woman with signs of hepatitis which cleared up on treatment with emetine. No entamoeba were seen in the stools, but the patient gave a history of previous treatment for mucous colitis. The fourth is designated amebic abscess of liver without history of dysentery and with negative stool evidence [but in the notes given in the text no evidence of the abscess having an amoebic origin is adduced]. The patient

had undergone a cholecystectomy [cause not stated] and 19 days later began to develop an abscess of the liver. Operation was performed but death occurred with general peritonitis. H H S

M-GRATH (John) O'FARRELL (P. T.) & BOLAND (S. J.) *Giardial Steatorrhoea. A Fatal Case with Organic Lesions.—Irish J Med Sci* 1940 Dec pp 802-816. With 8 figs. on 4 plates. 27 ref.¹

The case recorded is remarkable in so far as it closely resembled a typical case of idiopathic steatorrhoea. The essential facts are preceded by a physiological exposition on the chemistry of lipoids and the process of their absorption. There is evidence that fatty acids are assimilated through the mucosa by the aid of phosphatides and that the presence of unsaturated fatty acids is necessary for the absorption of other fatty acids and for excretion of waste products.

Phosphorylation a process which enables fat to be ingested, takes place on the surface of the epithelial cells covering the villi. The absorption of fats will therefore be lessened, or prevented if the surface epithelial cells are damaged or destroyed. The failure to absorb fats will be in direct proportion to the extent of this destruction. Therefore increased faecal fat content may arise in three different ways—(a) the digestion of fats may be deficient owing to obstruction, failure of bile and lipase or because of intestinal hurry or (b) the ultimate absorption of fats may fail owing to destruction of the lacteals and mesenteric lymphatics or (c) there may be interference with absorption of fats in the mucosa of the intestine. In the first type the stools will contain a large proportion of neutral unsplit fat whilst in the other two the faecal fat is mostly split.

In the present instance there was interference with fat absorption (as in true idiopathic steatorrhoea) and also similar interference with carbohydrate metabolism. The patient was a man of 40 of good physique and weighing 14 stone. At first there was loss of weight accompanied by signs of subacute cholecystitis. Cholecystectomy was performed (unfortunately the gall bladder was not pathologically examined). Subsequently symptoms of steatorrhoea became acute with anaemia, clubbing of fingers and increasing dehydration. Death occurred within five months. On two separate occasions duodenal contents obtained by intubation were found to contain vast numbers of active *Giardia intestinalis* and it is noteworthy that, in spite of intensive search, none of these flagellates or their cysts was discovered in the faeces.

The radiological appearances of the intestinal tract resembled those described by CAMP (1834) and KANTOR (1839). The normal mucous membrane pattern in the jejunum is to a great extent obliterated, the upper loops being most frequently involved and the destruction of the *valvulae conniventes* so complete as to cause the "mouldage sign" resembling a tube into which wax had been poured. [This section is illustrated by excellent radiographs.] In short the findings were very suggestive of idiopathic steatorrhoea. At this stage the general features of the case seemed to point to a diagnosis of Gee-Thayssen disease (idiopathic steatorrhoea) on the general grounds of emaciation dehydration clubbing of fingers, irregular diarrhoea, oedema of the legs hyperchromic anaemia hypochlorhydria low fasting blood-sugar flat blood-sugar tolerance curve diminution of serum calcium, normal

serum phosphorus and phosphatase marked excess of faecal fat with normal splitting haemic heart murmur and X ray findings

The possible relationship of *Giardia* to intestinal disease is next considered in a review of the literature with special reference to its occurrence in the biliary tract and duodenum especially the findings of ROMANO *et al* (1938) [this *Bulletin* 1939 Vol 36 p 605] EUSTERMAN (1939) and BONANNO (1940) upon which it is inferred that heavy infestation with this parasite may cause severe or possibly fatal illness. Moreover MILLER has described a syndrome of giardiasis in children in England which closely resembles coeliac disease WESTPHAL & GEORGI operated upon a case of cholecystitis due to *Giardia intestinalis* and found the walls of the gall bladder thickened and hyperaemic.

At autopsy the main pathological changes were in the small intestine. The walls of the duodenum and upper part of the jejunum for about twelve inches were very thin. The *valvulae conniventes* were practically absent. In sections the villi and crypts appeared to be denuded of surface epithelium. In general the villi reminded one of a gaunt dead tree with rotting branches from which the bark had peeled. Further along the jejunum the villi tended to disappear altogether in places giving rise to the appearance of bald patches. The ileum in many areas was thickened with stenosed lumen and for a considerable extent the mucous membrane was entirely absent in fact the condition closely resembled regional ileitis (Crohn's disease). The pathological changes did not extend beyond the caecum.

In scrapings made from the surface of the mucosa of the duodenum and jejunum and from ulcerated areas of the ileum multitudes of *Giardia* were found. The enlarged mesenteric glands were due to hyperplasia. no evidence was obtained in sections that *Giardia* had penetrated the villi and crypts of the intestinal mucosa. It is significant that lesions similar to those of regional ileitis have been previously ascribed to giardiasis by SHAPIRO (1939) and BARBOUR & STOKES (1936).

The clinical findings which so closely resembled idiopathic steatorrhea were caused by injury to or destruction of the epithelial lining of the small intestine giving rise to the syndrome of chronic jejuno-ileal insufficiency. [BENNETT & HARDWICK this *Bulletin* 1941 Vol. 38, p 7] It is claimed that this is the first case of giardiasis recorded in Ireland.

[No further comment is possible at this stage, but the detailed presentation of this thoroughly worked out case will undoubtedly stimulate further investigation into the pathogenicity of *Giardia*. In this connection it may be noted that the reviewer has already described a sprue-like syndrome in association with massive infection with *Giardia*. (*Dysenteric Disorders* 1939 p 267) References to the other workers quoted are given in the original paper.]

P Manson Bahr

VOTRINA (E. N.) Sur la question du traitement de la lambiose par l'acriachine [Treatment of Giardiasis with Acricline].—*Sovetskoe Zdravookhranenie Turkmenii* [Soviet Health Protection of Turkmenia] Ashkhabad, 1940 No 1 [In Russian pp 22-24. French summary (5 lines) p 24.]

The author reports the results of treatment of 25 cases of *Giardia* infection with acriquine [atebrin]. In eleven of these the symptoms

are attributed to the presence of the flagellates alone while in the remaining cases they may have been due to concomitant diseases (pellagra, sprue ankylostomiasis). The clinical manifestations of giardiasis were of two types (1) enterocolitis and (2) cholecystitis. Though the author does not commit herself to any definite opinion as to the pathogenicity of the flagellate, she advocates treatment in all cases of infection, in view of the successful results obtained with acricuine. This drug was administered either intraduodenally or *per os*. In the first method 10 cc. of 2.5 per cent. solution of acricuine is introduced through a duodenal tube followed 10 minutes later by 40 cc. of 33 per cent. solution of magnesium sulphate and afterwards by lavage with saline. The treatment is carried out 3-5 times with intervals of 2-3 days between each administration. When given by mouth the doses are 0.3 gm. *per diem* the course being divided into two 5-day cycles and one 3-day cycle the interval between the first and second cycle being 5 days, and between the second and third 10 days. The results of the treatment by both methods were similar. The flagellates disappeared from the stools and could not be recovered from the duodenal contents but while in the cases with giardial enterocolitis there was a general improvement in the condition of the patients, in the cases with cholecystitis no immediate improvement could be observed. In those cases in which giardiasis was associated with other diseases the treatment likewise resulted in the elimination of the flagellates. In view of its simplicity the author gives preference to the peroral method of administration of the drug. C. A. Hoare

LOVE (Julian) & TAYLOR (Gordon B.) Atabrine in the Eradication of *Giardia lamblia*.—U. S. Nav. Med. Bull. 1940 Apr. Vol. 38. No. 2 pp. 239-242.

Three patients with *Giardia intestinalis* infection, two of whom suffered from diarrhoea and vague abdominal discomfort and one who had no symptoms were treated with atabrine 0.1 gm. three times a day for five days. A single course eradicated the infection in two cases but in the other this result was not obtained till the course was repeated after a five days interval. In a footnote to the paper two further successful cases are mentioned. It is concluded that atabrine is an effective agent for the treatment of *G. intestinalis* infections, which may cause clinical symptoms in some cases. C. A. W.

NELSON (E. Clifford) An Intestinal Content Cultivation Medium. I. Methods of Preparation and Use and Data obtained in the Cultivation of *Balanitidum coli* from the Pig.—Amer. Jl. Trop. Med. 1940 Sept. Vol. 20 No. 3 pp. 731-745 [10 refs.]

A simple medium for the cultivation of *Balanitidum coli* has been devised. It consists of a mixture of one part of caecal contents of the pig and nine parts of Ringer's solution. The mixture is first strained through a sieve and then through a funnel lined with absorbent cotton. The pH of the resulting liquid varies according to the pH of the caecal

contents from which it was prepared. The higher the pH the longer will the culture of the dilute survive for it dies when the pH falls to 5 as it does after varying intervals. The greatest length of life of a culture was 34 days. For some reason not yet understood the bacterial growth in the medium is self limited, so that bacterial overgrowth does not occur as in some other liquid media. It is thus possible to use the medium in large quantities. Flasks containing 200 cc. have maintained cultures for 34 days yielding as many as 8,260 balantidia.

C M W

OUYANG (George) **Acute Bacillary Dysentery in Infants and Children. An Analysis of 315 Cases.**—*Chinese Med J* 1940 Oct. Vol. 53 No 4 pp 456-472.

This interesting study is based on the records of patients admitted to the children's ward of the Peiping Union Medical College in eight consecutive years 1930-38. Sixty-six (20.9 per cent) were under 12 months old, 124 (39.3 per cent) between one and two years, and 54 (17.1) between two and three years—that is 60.3 per cent. of the total 315 were under two years and more than three-fourths (77.4 per cent) were under three years. The fatality rate was highest in the very young—half those attacked under one year died—45 (36.2 per cent.) of those between one and two years. The incidence was noticed to increase in May reach a peak in July and then decline during the next three months. The two chief strains of organism concerned were *Bact. dysenteriae* Shiga in 61 of whom 21 died—one of the mannite fermenting group in 127 of whom 34 died—these two were found associated in 8 one of whom died.

The incidence was higher among the poor and ill nourished. The symptomatology was noteworthy. Usually the temperature rose suddenly at the onset in some falling by crisis the next day although the toxic symptoms appeared to be severe—in others the fever rose and death occurred in 24-48 hours with hyperpyrexia. In others again irregular and remittent high fever was observed, lasting for 3-4 weeks but in most the early rise soon subsided and a low grade fever around 38°C would persist for a week or two. In all cases blood could still be found in the stools a week or more after the temperature became normal. The number of stools might reach 30 and even 45 a day often accompanied with pain and tenesmus. Blood was seen by microscope in 207 of 256 stools taken on admission—gross blood was not often seen. Nearly half the children (136 or 43.2 per cent) vomited at the onset (no more in Shiga than in Flexner infections) and in some this was the main complaint for which the child was brought. Convulsions were present in 90 or 28.6 per cent. usually at the onset. In seventeen this was the chief complaint at the onset. Forty-one of the 90 were infected with one of the Flexner group 13 with the Shiga organisms. The commonest and worst complication was broncho-pneumonia which was seen in 58 of the cases and ended fatally in fifty-four. Another worth special mention was thrombocytopenic purpura which was seen in four all of whom died. The author explains the development of this complication by assuming it to be the result of the action of the bacterial toxin on the bone-marrow or the platelets and related to deficiency of vitamin C. Death

however was not averted in any of those attacked in spite of administration of ascorbic acid parenterally in large doses.

Treatment No food, water only was given for the first 24-48 hours then in small amounts and gradually increased to a maintenance level. The body dehydration occurring in acute bacillary dysentery is of the nature of a medical emergency and may be combated by subcutaneous or intraperitoneal saline the former was given in quantities of 100-200 cc. in each thigh by the gravity method, the latter in quantities of 200-350 cc. at a time. Glucose intravenously 5 per cent. in normal saline in doses of 25 cc per kilogram body weight gave good results. In very severe infections glucose was administered by continuous intravenous drip to 18 patients. Blood transfusions were performed in 114 patients 15 cc. per kilo. body weight. During the first fortnight they are given with a view to combating toxicoses, after that for increasing general resistance and controlling secondary infections. Polyvalent antidysentery serum was given and the author states "The effective ness of serum in controlling the infection is doubtful," but it was tried in nine patients only who were very ill with convulsions and temperatures of 40°-41°C and five died within the first two days of the illness. The course of the disease in the other four differed little from that in others who recovered without serum treatment

H H S

OTTO (H) Die Ruhr bei der Feldtruppe in Polen [Dysentery among the Troops in Poland].—*Arch Woch* 1940 Mar 10 & 23 Vol 19 Nos 11 & 12 pp 241 245 272-276

An investigation of 300 cases of dysentery at Radom [*i.e.* nearer the field than GANTENBERG'S investigation in Berlin see *Bulletin of War Medicine* 1940 Sept No 1 p 34]. The cases were diagnosed as Shiga or Flexner infections by agglutination bacteriological diagnosis was often negative. Epidemics were noticeably associated with plagues of flies. Ants were not responsible. Excessive eating of raw fruit coincided in the same period (September 1939) with the prevalence of flies, and probably contributed to the aetiology both by direct contamination and by setting up a mild intestinal catarrh. Direct contact also probably spread the disease among troops in the field, as it did to nurses in hospital. Exact bacteriological classification was not practicable.

It is stressed that any enteric outbreak among troops should be very seriously viewed, as neglect is apt to be followed by a major disaster. The cases in this outbreak fell into four groups.—

Abortive cases—One or two days of diarrhoea, no mucus or blood in the stools, or definite pain. Some cases were febrile. Remained in their units, able to work and recovered in a day or two. Some severe cases started this way and as the abortive type may be infectious, it is better to treat it as serious.

Mild cases—With mucus and blood in the stools, moderate diarrhoea, a little pain, weakness, headache and anorexia. Very little pyrexia (only in one or two paradoxically constipated cases). A little tenderness in the sigmoid and at the flexures, no vomiting, pulse strong and regular, no dehydration nor complications, complete recovery after short convalescence.

Moderate cases—Features arise from (1) toxæmia (2) local lesions in colon and small intestine and (3) defective intestinal function.

Severe prodromal symptoms paroxysmal attacks of vascular collapse with lividity and small rapid pulse cerebral toxic collapse from oedema of the brain dehydration and toxic wasting severe hæmorrhagic colitis up to 20 stools a day with blood, pus and mucus intestinal colic and abdominal tenderness high pyrexia defective absorption leading to chloride deficiency and tetany. Duration about 3 weeks. Some cases of severe cerebral symptoms such as insomnia and psychoses suicidal or catatonic, were seen in this Polish epidemic although this is not usually described and patients with severe infection as a rule die without any mental deterioration. Many of these moderately severe cases had a past history of appendicitis or other gastrointestinal illness. Some of the moderate cases relapsed and persisted in sub-chronic form with pyrexia and tachycardia. Convalescence of moderate cases took weeks or months. The patients became weak and thin and took a long time to gain weight.

Severe cases—Severe headache and anorexia at the onset but the disease may come on gradually and become grave only after it is established. High fever falling before death severe diarrhoea and tenesmus, or constipation followed by porridge-like diarrhoea. Stools were passed every ten or fifteen minutes bellies were sunken and tender liver and spleen not enlarged bladder often distended through spasm of sphincter. The appearance was that of severe illness with sunken eyes profound dehydration *facies hippocratica* and emaciation to a skeleton. The picture is so like Simmonds disease as to suggest that there is an endocrine disorder as well as dehydration. There may be cramps as in cholera. Death may result from cardiac weakness with pulmonary congestion or from sudden heart failure. A sudden change from muco-purulent stools to thin brown offensive fluid is a grave sign. Some of the rapidly fatal cases were stuporose or sleepy though rational when roused this was probably due to the severe toxæmia. Another group of fatal cases appeared superficially to do well for three weeks, although a good clinician could see that the unsteady rapid pulse occasional pyrexia and continued slime and pus in the stools boded ill. They went suddenly downhill and died in twelve hours in spite of all known circulatory restoratives.

Complications—Two cases of arthritis relieved by salicylates. Three cases of suppurative parotitis drained two died (Parotitis appearing early is not serious but later in a case it is a fatal sign). Four cases of conjunctivitis of short duration were seen. Membranous pharyngitis which responded to gargling with red wine occurred in severe cases. Two cases of renal colic apparently due to spasm of an empty ureter were met with. Gastritis and inflammation of the small intestine with green stools were features of some of the severe cases. In two patients jaundice occurred with enlarged liver but without splenomegaly. Neither nephritis nor general peritonitis were seen but in one patient there was fatal localized peritonitis. Development of paralytic ileus with constipation and distension was observed in one and profuse intestinal hæmorrhage in six. A few cases of bronchopneumonia and one of bronchitis with asthma were seen. Peripheral neuritis and trophic oedema were noted and toxic hiccup was an ominous sign. Two patients developed furunculosis of the buttocks and two prolapsus ani. Two cases of tetany cured by intravenous calcium were seen. Wounds in dysenteric patients healed badly.

The post-mortem appearances described suggest that the infection was mainly with Flexner bacilli.

Treatment—Strict rest in bed is essential, leaving the bed-pan with the patient if necessary. If the patient were seen in the first six days a dose of castor-oil was given but not calomel. Animal charcoal in multiple divided doses was useful. Tannalbin was not effective and bismuth subgallate like calomel, was liable to be absorbed and cause poisoning. Opium seemed to do more harm than good. Atropine and hot fomentations were effective for colic and tenesmus. Diet consisted of biscuits for not more than three days followed by a progressively increasing soft bland diet of cereals, eggs and milk. Cocoa, chocolate and red wine were given. Apple-pulp was used largely, up to 2 lb a day. Lemons were also given freely to provide vitamin C. Fluid was given in large quantities, mainly as tea or coffee. Cold drinks were found to increase colic. Salt was added to all drinks. Soft cheese, liver sausage and honey were found useful additions to the diet. Full diet was started when the stools became semi-solid and free from pus, blood and mucus. Salines were given subcutaneously in doses of 250 cc twice a day for dehydration and for chloride loss 20-30 cc of 20 per cent. sodium chloride intravenously. Circulatory failure was treated not only by stimulant drugs, but also by doses of 60 cc of 25-30 per cent glucose intravenously. Adrenalin was found useful for collapse. Bromides were better than morphine to make the patients comfortable and barbiturates were found to be the best remedies for insomnia. Hiccup responded only to large doses of amiodipyrine or to cocaine. Blood transfusion was used in only two cases but it seemed to do good. Very little anti-dysentery serum was available but it seemed very valuable if given within the first week.

Charles Newman

REITLER (Rudolph) & MARBERG (Kurt). Note on the Treatment of Acute Bacillary Dysentery with Sulphapyridine. [Memoranda]—*Brit Med J* 1941 Feb 22 pp 277-278.

The results obtained by the authors were so astoundingly good that it is hoped that others will make trial of the method with a view to confirming their findings. So far only 20 patients are reported upon, but their infections were varied and all were clinically severe cases. They included 13 infections by Flexner, 4 by Shiga, and one each by Strong, Sonne-E and Schmitz, all confirmed bacteriologically.

On the day of admission the patients were under observation, but not treated in order that the conditions before and after treatment might be compared. On the second day sulphapyridine two tablets (= 1.0 gm) were given by mouth, with NaHCO_3 to counteract nausea, three to four times daily for 2 to 4 days, according to the effect produced. It was usually administered for 24 hours after the motions became formed. No other treatment was given.

Usually in 24 hours the temperature fell, the diarrhoea was reduced and in most cases the stools were normal in 48 hours. (Three patients took 3 days and one 4 days.) Toxic symptoms were seen in two Shiga infections and one Flexner, these also rapidly improved. Stools were bacteriologically negative when they became formed and in no case so far has a relapse occurred [but the interval since "cure" is not stated].

The following table gives the results detailed for each patient —

Table showing Results of Sulphapyridine Treatment of Bacillary Dysentery

Case No	Type of Dysentery	Day of Disease when Admitted	Motions per Day						Duration of Sulpha pyridine Administration (Days)
			Observation Day	Day of Treatment					
				1st	2nd	3rd	4th	5th	
1	Flexner Y	3	28	8	2	1	1	1	2
2	Flexner Y	3	23	8	1	1	1	1	2
3	Shiga	6	29	13	8	3	2	1	4
4	Flexner Y	2	46	52	10	3	3	1	4
5	Flexner Y	2	34	38	19	0	1	1	3
6	Flexner Y	2	19	30	4	2	1	1	3
7	Shiga	6	56	13	0	0	1	1	2
8	Flexner Y	4	8	10	0	1	1	1	2
9	Sonne-E	6	15	11	4	1	1	1	2
10	Flexner Y	9	14	4	3	2	1	1	3
11	Flexner Y	3	18	16	0	1	1	1	2
12	Strong	1	9	12	2	1	1	1	3
13	Flexner Y	4	14	16	5	1	1	1	3
14	Flexner Y	1	8	15	6	1	1	1	3
15	Shiga	4	30	28	35	19	6	2	4
16	Flexner Y	1	30	12	4	0	1	1	3
17	Schmitz	2	8	14	4	2	1	1	4
18	Flexner Y	2	8	9	6	2	3	1	4
19	Shiga	5	30	19	8	1	2	1	3
20	Flexner Y	2	18	20	2	0	1	1	3

[See also this *Bulletin* 1940 Vol. 37 p 868]

H H S

BERIBERI AND OTHER VITAMIN DEFICIENCIES

PRICES OF ABSTRACTS IN THIS SECTION

FRIDLY (p 282) quotes Japanese work to show that the milk of women suffering from beriberi is toxic to their infants and produces infantile beriberi when the reserves of vitamin B₁ in the infants are depleted. This milk gives a negative peroxidase reaction which becomes positive when the mother is given adequate doses of vitamin B₁. In overfed babies the disease assumes an acute form in the underfed it tends more to chronicity.

WEISS (p 283) discusses beriberi as seen in America and Europe where though the classical forms may be seen the symptoms are more frequently those of heart disease alone, and are often associated with alcoholism. In these cases thiamin has a marked effect. WALSH (p 283) discusses polyneuritis, of which beriberi is one cause and stresses the fact that vitamin B₁ is not antineuritic except in relation to a high carbohydrate diet. He does not believe that polyneuritis is in general due to vitamin deficiency. FANTUS *et al* (p 284) have discussed subvitaminosis B₁.

SISON and FERMIN (p. 284) give details of a case of beriberi which responded dramatically to thiamin chloride, of which 10 mgm were injected as the first dose. Details of further treatment are given. SWAN and LAWS (p. 285) describe a case of cardiovascular disturbance with general oedema, in which the diet had been deficient in vitamin B₁. Treatment with Betaxan was successful. LEONG (p. 285) has estimated the thiamin content of foods available in Malaya.

HARUNAKARAN and NAIR (p. 286) describe a syndrome seen in an asylum in Travancore. This consisted of dermatitis of the scrotal region with stomatitis, follicular keratitis, bleeding from the gums and anaemia. It appears to have been due to polyvitaminosis and was treated with buttermilk, marmite and cod liver oil.

YOUNG and CLARK (p. 286) describe a condition of hypovitaminosis in labourers in East Africa. There was haemorrhage into the muscles of the legs and bleeding of the gums together with skin changes like those of vitamin A deficiency and of pellagra. C II

PERILLA Lydia. Infantile Beri-Beri in Hong Kong.—Reprinted from *Cadmus Hong Kong* 1940 May Vol. 19 No. 2 pp 78-83 39 refs. Also in *Jl Trop Med & Hyg* 1941 Feb 13 Vol. 44 No. 4 pp 21-26 40 refs.

Japanese workers have shown that the milk and urine of women suffering from beriberi are toxic to infants and mice. The toxic substance consists chiefly of methyl glyoxal. The milk from vitamin B₁-deficient women gives a negative peroxidase reaction, due to inhibition of the reaction by methyl glyoxal. The reaction becomes positive when the mother is given some source of vitamin B₁. The symptoms of infantile beriberi are produced by the toxic milk which is only effective however when the infant becomes depleted of its vitamin B₁ reserves.

In the present investigation 18 per cent. of the infants brought to a Welfare Centre were suffering from beriberi. Of 83 nursing mothers 32 were secreting milk which was peroxidase-negative and 14 of the 32 had symptoms suggestive of adult beriberi. Of the infants of the mothers with peroxidase-negative milk 81 per cent. showed signs of infantile beriberi of varying degrees of severity but mostly mild. All the affected mothers gave histories of several infantile deaths. After the administration of vitamin B₁ (not less than 500 I.U. daily) the milk showed a positive reaction within a few days. The infants were given, at the same time 50-500 I.U. daily. In infants the disease was acute, subacute or chronic. The overfed babies developed the acute form, the underfed the subacute or chronic form. Vomiting was a symptom common to all types and cyanosis was always a danger sign. In the acute form the symptoms were those of heart failure with a normal temperature. In the subacute, puffiness of the face and oliguria occurred, whilst in the chronic form marasmus, which might last for weeks, was the prominent sign. The untreated acute form was always fatal. In Hong Kong food prejudice partly accounts for the large incidence of infantile beriberi. Most mothers ascribe their symptoms to "fung" (wind) and therefore abstain from fruits and vegetables. They are less careful about female infants and therefore more males develop beriberi. It is important to note

that Fung Taam (wind-mucus) is acute infantile beriberi and is identical with Taon in the Philippines. Malau gam (monkey disease) is chronic infantile beriberi. *H N H Green*

WEISS (Soma) **Occidental Beriberi with Cardio-Vascular Manifestations. Its Relation to Thiamin Deficiency**—*Jl Amer Med Assoc* 1940 Sept 7 Vol. 115 No 10 pp 832-839 With 1 chart [50 refs] [Summary appears also in *Bulletin of Hygiene*]

This is a review of clinical and experimental investigations chiefly by the author and co-workers on the relation of circulatory disorders to beriberi. Beriberi in both its wet and dry forms occurs regularly in America and Europe and is similar in all its essentials to the disease as seen in the East. The author has observed a large number of cases with beriberi heart the chief indications of which are the dietary history, a reduced excretion of thiamin and the clinical response to thiamin chloride treatment. Symptoms of heart disease when other aetiological factors have been excluded suggest a search for possible thiamin deficiency as a cause. Excessive alcohol consumption is very commonly associated with beriberi in the Occident though alimentary disease and dietary restrictions are also factors. It is suggested that the high pneumonia mortality of alcoholics may be in part due to a nutritional deficiency. It has been shown that electrocardiographic changes occur both in man and animals given a diet lacking thiamin. The effects observed on the animal heart include tachycardia, bradycardia, cardiac dilatation, congestive failure of the circulation and tissue changes in the myocardium. In the rat the effect does not appear to be due to accumulation of intermediary metabolites but rather to a direct effect on the metabolism of the heart. There is no explanation yet as to why with a similar diet either dry or wet beriberi may appear though if polyneuritis first occurs the diminished exertion of the patient will prevent cardiac failure arising. In treatment large doses of thiamin are given preferably subcutaneously. If the case is one of beriberi heart oedema and other lesions clear up fairly rapidly and there is a marked diuresis. Thiamin has no effect on any other type of heart disease. *H N H Green*

WALSHE (F M R.) **Aetiology of Polyneuritis**—*Lancet* 1941 Jan. 11 pp 33-35

Polyneuritis is a bilateral symmetrical affection of the peripheral nerve trunks of the limbs, involving both the sensory and motor fibres. The cranial nerves and central nervous system may be affected and there is always myocardial involvement. Whatever the aetiological agents (of which no more than 10 can certainly be incriminated) there is uniformity of behaviour in all the cases which suggests that the lesions may be due to a single toxic metabolite. Beriberi is a typical polyneuritis but it is not certain that B_1 deficiency is responsible for any other form of polyneuritis though there is good evidence that alcoholic polyneuritis is associated with vitamin B_1 deficiency. Even in beriberi the lesions of the nerve cells are inadequate to account for the type of degeneration seen in the peripheral nerves. It tends to be forgotten that vitamin B_1 is not antineuritic except in relation to a high carbohydrate diet. polyneuritis does not occur for instance

in anorexia nervosa. The main features of polyneuritis are qualitatively the same in the acute infection, subacute (e.g. diphtheritic) and in the chronic (e.g. alcoholic) types. In the author's experience intensive B₁ therapy does not influence acute infective polyneuritis, nor has he seen chronic cases improve more rapidly with B₁ therapy than they did in pre-vitamin days. Treatment still remains as before, with complete rest in bed until the process ceases to progress actively. The author is not a convert to the view that polyneuritis is, in general, due to vitamin deficiency.

[The author does not make it clear whether his chronic cases which showed no response to vitamin treatment included alcoholic cases. This is important because it is the one form of polyneuritis (apart from beriberi) in which there appears to be some agreement as to the value of B₁ therapy.]

H. V. H. Green.

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 1940. Aug. 10
Vol. 115 No. 6 pp. 450-454 The Therapy of Subvitaminosis B₁. [Edited by Bernard FANTUS in collaboration with Eugene F. TRALT & Regina Stolz GREENEBAUM.]

This is an article of a lecture to students type covering well the ground indicated in the title. The authors postulate, as their basis, that subvitaminosis B₁, beriberi and thiamin deficiency are synonymous terms. They then consider circumstances in which this condition is likely to arise such as inadequate food or an unbalanced diet, inadequate absorption, from disease, relative inadequacy in conditions where the demand is for more than the normal amount (fevers, pregnancy and lactation) and so on. Next the early premonitory and the established and late signs are discussed and their diagnostic importance. Finally treatment which is divided into prophylactic and therapeutic and the indications for continuance of treatment, with detailed consideration of the dosage of thiamin to be adopted and the modes of its administration. The advantage of an article such as this is that it deals with the text-book orthodox aspect, but at the same time gives to the medical public the benefit of wide personal experience.

H. H. S.

NISSON (Agencia B. M.) & FERNAN (Elvira V.) Spectacular Response to Thiamin Chloride of a Case of Pernicious Beriberi (Thostu).—*Acta Med. Philippina* 1940 July-Sept. Vol. 2 No. 1 pp. 1-13. With 1 plate. 10 refs.

A man of 31 years was admitted to the Philippine General Hospital on account of dyspnoea and general anasarca. His illness had started two years before with palpitation, ready fatigue, dyspnoea and pain in the chest, and, six months later, ascending oedema. The chief physical signs on admission were pallor of face, visible pulsation in the neck, heart enlarged, no cardiac murmurs, blood pressure systolic 169 diastolic 70. These indicated "hypertensive myocardial disease with congestive failure." Digitalis was given but, as might have been expected, fruitless. The patient became dull and incoherent, the heart took on a gallop rhythm and death seemed to be imminent. It was not till this stage was reached that the idea of beriberi as the cause came to be considered. Thiamin chloride 10 mgm. was injected and caffeine sodio-benzoate hypodermically and oxygen

inhalations were started. Improvement set in at once tiki tiki extract 15 cc. was given by mouth. Strychnine was injected for a few days. In five days from the start of thiamin the oedema had almost disappeared dyspnoea and polypnoea had cleared up there was some ascites but this too passed. After receiving a total of 100 mgm. of thiamin chloride intramuscularly and 150 mgm intravenously the patient was able to be up and about but knee-jerks were still absent, there was diminution of motor power and inability to rise unaided from a sitting posture. Thiamin was discontinued Betaxan given instead (2 mgm. intravenously for 33 days) When leaving hospital he still had absent knee-jerks somewhat slow mentality (but the state of this before admission could not be ascertained as the patient's relatives could not be communicated with) H H S

SWAN (W G A.) & LAWS (F) *A Case of Beriberi Heart.—Brit Heart J* 1940 Oct. Vol. 2. No 4 pp 241-246 With 3 figs.

[The title of this paper is misleading. The title of the preceding article in this journal would have been more appropriate *Cardio-vascular Disturbances caused by Deficiency of Vitamin B₁* for this patient did not show the symptoms typical of beriberi.]

The case here recorded is that of a man aged 55 who from poverty had only 9 shillings a week to live on after paying his rent. His diet consisted of white bread 4 rounds a day or four 2½d loaves a week 2 boiled eggs 8 oz tinned milk, potatoes, sausage meat and beer 1½ pints together yielding only 819 I U of vitamin B₁ in the week.

He presented general oedema but no respiratory distress when he was at rest deep reflexes were active there was no alteration of sensation in fact no neuritic symptoms at all. The pulse was regular not unduly fast, the diastolic pressure not low and the pulse pressure about normal. The liver was neither enlarged nor tender.

Betaxan was given and after 24 hours the urinary output increased (160 oz. on the fifth day) the oedema subsided and in ten days he felt quite well. The vitamin was continued in 2 mgm. doses (he received altogether 32 mgm.) and he left hospital 2 months after admission, free of symptoms. H H S

LEONG (P C) *Vitamin B₁ (Thiamine) Content of Foods.—Jl Malaya Branch Brit Med Assoc* 1940 June Vol. 4 No 1 pp 66-107 With 3 charts. [33 refs.] [Summary appears also in *Bulletin of Hygiene*]

This article cannot be abstracted, but is of great value for reference. The author has estimated the thiamin content of foods available in Malaya dividing them into ten groups: 1 Cereals and pulses and their products (47) 2 Fruits (67) 3 Nuts and oil seeds (19) 4 Greens roots and other vegetables (88) 5 Milk and milk products (20) 6 Eggs (7) 7 Meat and meat products (36) 8 Fish and other marine products (34) 9 Poultry and game (14) 10 Miscellaneous including bird's nest coriander gingelly oil honey sago tamarind treacle yeast (15)

Other tables show the effect of cooking on the thiamin content of 15 foods boiled in water for 10 minutes 23 boiled for 20 minutes and 5 for 30 minutes, and of 12 others fried in coconut oil for 10 minutes

The reduction in vitamin B₁ might be very great (up to 80 per cent. in the case of lettuce boiled for 10 minutes) or it might be nil. An instructive discussion of each of these groups follows. *H H S*

VEDDER (E B) Beriberi and Vitamin B₁ Deficiency.—*Amer J Trop Med* 1940 Sept Vol 20 No 5. pp. 625-640 [37 refs.]

JOLLIFFE (Norman) Recent Advances in Clinical Applications of the B-Vitamins.—*J Amer Dietetic Assoc* 1941 Jan. Vol 17 No 1 pp 6-11 [17 refs.]

KARUNAKARAN (C O) & NAIR (P Krishnan) The Treatment of Scrotal Eczema, Stomatitis and Allied Conditions caused by Vitamin Deficiency.—*Indian J Med Res* 1940 Oct. Vol 28 No. 2. pp 371-383 With 5 figs on 2 plates. [21 refs.]

The authors record observations made upon the treatment of an affection which broke out in a large asylum at Travancore. The chief complaint was a dermatitis involving mainly the scrotum, the groins and penis this was associated with angular stomatitis, glossitis, follicular keratitis (phrynoderma) and xerophthalmia in many cases, also bleeding from the gums and anaemia in some proportion, and, in a few burning sensations in the palms and soles. In none were there signs of nerve lesions, diarrhoea or dermatitis on the limbs. In a few the mucocutaneous junction of the prepuce was affected.

This syndrome will be recognized as resembling those which have been described now many times and reported in this *Bulletin*. Ninety-two cases in all came under observation [what proportion of the asylum population is not stated] scrotal eczema was present in 81 angular stomatitis in 60 glossitis in 58, phrynoderma in 29 xerophthalmia in 27 bleeding from the gums in 27. For the purposes of evaluating treatment cases were divided into groups and transferred from one group to another as necessary. The results are shown in a number of tables which cannot be reproduced here and which it is impossible to condense.

The general conclusions are that "the sore mouth is due almost wholly to the deficiency of the vitamin B₁ factor" while "the scrotal eczema appears to be a polyavitaminosis."

The best all-round results for all five symptoms in the complex appear to have been obtained with buttermilk or with marmite and codliver oil at the same time. The authors think one factor may have an adjuvant action upon another. *H S STANLEY*

YOUNG (W A) & CLARK (E Makrohm) Report of a Small Epidemic of Hypovitaminosis.—*Trans. Roy Soc Trop Med & Hyg* 1940 Nov 30 Vol 34 No 3 pp 249-260

In this interesting article the authors describe what they call a small "epidemic" of hypovitaminosis. Their cases numbered thirty-one and the outbreak occurred among adult male African natives recruited three to four months previously near Kisumu on Lake Victoria. Nanza employed as labourers on road-making in a dry semi-desert country where the diet provided was very foreign to that they usually enjoyed. Of the actual incidence of the affection no mention is made. The symptom for which these men sought treatment was an

inability or reluctance to walk interpreted by the observers as due to stiffness weakness and a desire to avoid pain. Examination showed swelling and induration in some one or more groups of muscles in the calf of one or both legs or in the muscles of the front or back of the thigh associated with a hot shiny superjacent skin but no true oedema. The condition was afebrile. Exploration of the affected part revealed a haemorrhagic condition involving the muscle it was difficult to distinguish between muscle tissue and blood clot. The condition is referred to [wrongly in the light of the further observation] as a myositis. The lower limbs only were affected, in a few cases a bloody effusion into a joint was noted and in one a haemothorax. The gums which at first were considered to be healthy were later discovered to bleed easily.

The second point of interest common to the majority of these cases was the occurrence of some affection of the skin including the follicular hyperkeratosis commonly ascribed to a vitamin A deficiency, dryness and general hyperkeratinization a mosaic appearance with hyperpigmentation of the skin of the legs and thickening with wrinkling and hyperpigmentation of the skin over the knees ankles knuckles etc conditions not uncommon in pellagra. There was however no night blindness nor xerophthalmia on the one hand and no sore mouth no glossitis and no gastrointestinal disturbance on the other. No albuminuria but bradycardia and exaggerated knee jerks were noted. The cogent fact than an outbreak of scurvy occurred among native troops stationed in the same district in 1928 is mentioned. [The authors have added one more to the many accounts now recorded of conditions occurring among native races due to nutritional deficiencies. Scurvy may at any time present a puzzling picture when first met with more especially if for diagnosis text-book descriptions of the disease are depended on. It is disappointing to find no references to treatment.]

H S S

PALLISTER (R. A.) Some Observations on Food Deficiency Diseases in Malaya.—*Jl Malaya Branch Brit Med Assoc* 1940 Sept Vol 4 No. 2. pp 191-197

EPIDEMIC DROPSY

PRÉCIS OF ABSTRACTS IN THIS SECTION

In an account of a comprehensive investigation LAL *et al* (p 288) show that the seeds of *Argemone mexicana* are to be found, in varying proportions in many stocks of mustard seed in India. They conclude from careful estimations, that oil containing less than one per cent. argemone oil or oil representing 1 mgm. of the reacting substance taken daily for 20 days is not likely to produce clinical symptoms.

SEN GUPTA and NAPIER (p 289) give details of the haematological changes in epidemic dropsy

C 11

LAL (R. B) MUKHERJI (S. P) DAS GUPTA (A. C.) & CHATTERJI (S. R.) Investigations into the Epidemiology of Epidemic Dropsy Part IX. Quantitative Aspects of the Problem of Toxicity of Mustard Oil.—*Indian J. Med Res* 1940 July Vol. 28. No. 1 pp. 163-166 With 2 graphs

This is an account of one of the most important of the investigations undertaken by the authors to elucidate the aetiology of epidemic dropsy. In this contribution they consider three questions: 1. To what extent seeds of *Argemone mexicana* are actually found in stocks used for pressing oil. 2. Whether a quantitative test could be developed to express the amount of toxic substance in terms of argemone oil in a sample of mustard oil. 3. How much toxic substance must be ingested to produce clinical symptoms.

To determine the first of these they obtained samples of the mustard seed daily from a certain oil mill in Calcutta and found that three of the samples of *Brassica juncea* contained 5 per cent. of Argemone seed. Rarely was a sample found to contain one variety only of seed—the name is given to the predominant type. In another series of samples from different oil mills and stocks of seeds from wholesale dealers, amounts of the Argemone seed might constitute 10 per cent. or more. The experiments directed towards determining the second question were of too intricate a nature for abstract, and anyone wishing to repeat and confirm them should consult the original. The conclusion of the authors is that "the form in which the reacting substance exists in the oil is not identical with the pure crystalline substance and the key to the nature of the toxin may be hidden here."

Investigations carried out into an epidemic at Satkhira show that many escaped because the amount consumed was just below that causing symptoms. Generally speaking, the presence of less than 1 per cent. of Argemone oil in mustard oil will fail to cause demonstrable symptoms of epidemic dropsy under reasonably average conditions of mustard oil consumption in Bengal.

The contents of this valuable contribution cannot be expressed better than in the authors' own words as given in their summary—

1. It has been shown that many stocks of mustard seed, particularly those of *B. juncea* found in oil mills, contain variable amounts of argemone seed. In some of these supplies the proportion of argemone seed, though sufficient to give rise to positive results with nitro acid tests in the oil expressed from them, may not be enough to cause symptoms of the disease. It is therefore a question whether a wholesale rejection of such supplies would be justifiable and whether it would not unnecessarily dislocate business. Quantitative aspect of the problem, therefore, assumes a considerable importance.

"2. A colorimetric quantitative test has been developed and gauging curves have been worked out from which milligrams of the reacting substance per 100 cc. of oil and roughly the percentage of argemone oil can be directly read off against the colorimetric (Pulfrich) reading.

3. It has been shown that light and air reduce the reacting-substance content of mustard oil containing argemone oil.

"4. While light is necessary for this reaction, presence of air is not essential in the case of mixtures of argemone oil in mustard oil. It is however necessary in the case of pure argemone oil.

"5. Both the visible and ultra-violet radiations act equally well in reducing the reacting-substance content of the oil. Direct light gives quicker results than diffused light.

"6. Heat is not concerned in this reaction.

7 Attempt has been made to determine the minimum quantity of argemone oil in mustard oil the consumption of which will produce symptoms. The problem has been tackled in various ways namely comparison of the toxic effects as suggested by the epidemiological histories with the reacting-substance contents of the oil tracing an oil containing known amount of reacting substance to the consumers and observing developments amongst them, concurrent study of the oil and of the persons consuming it and finally determining the reacting substance of samples of oil used in human feeding experiments.

8 All these studies point to the conclusion that oil containing less than one per cent. argemone oil, or oil representing 1 mg. of the reacting substance taken daily for 20 days is not likely to produce clinical symptoms.

H H S

SEN GUPTA (P C) & NAPIER (L Everard) **Haematological Changes in Epidemic Dropsy**—*Indian J Med Res* 1940 July Vol. 28 No 1 pp 197-206

Previous studies on the blood in epidemic dropsy gave varied results so the present research was done with standard methods on Calcutta labourers and the data were compared with those known standards for Indian population. The nature of the anaemia, the sedimentation rate and leucocyte changes were examined. The first included Hb content red cell count reticulocyte percentage van den Bergh test total cell volume and calculation of mean corpuscular volume mean corpuscular Hb and mean corpuscular Hb concentration. Of 11 males 2 were slightly macrocytic 1 slightly microcytic and 8 normocytic of 11 females 3 were slightly macrocytic 2 microcytic and 6 normocytic. The average case was orthochromic and normocytic or slightly macrocytic. The indirect van den Bergh was negative and there was no reticulocytosis i.e. there was no evidence of excessive blood destruction. This combined with the results of sternal punctures in 3 cases indicated that the anaemia was due to depressed erythropoiesis. The sedimentation rate (Westergren) was above normal in all of 34 cases and when the correction for anaemia was made in 21 cases the rate was still increased in 70 per cent. of the cases indicating that some factor was operative in addition to anaemia. The white cell count was usually normal but was occasionally a little high. The differential count did not differ much from normal but there was a shift to the left of the neutrophils.

W P Kennedy

MALARIA

PRÉCIS OF ABSTRACTS IN THIS SECTION

RAMAN (p 290) claims to have found a *P. ovale* infection contracted in India.

WOLFF (p 291) gives details of a simplified technique for his buffer precipitation test for the diagnosis of chronic malaria.

REED (p 291) has written a general article on the treatment of malaria. LYNCH and BRANDT (p 291) report a case of quinine poisoning in a child. STEPHENSON (p 292) reports success in the treatment

of malarial splenomegaly by the Ascoli method. Splenomegaly due to kala azar was slightly reduced in three cases, but the treatment had no effect on enlarged spleens due to bilharzia or to unknown causes.

HENDERSON and HOWARD (p. 297) have compared a Paris green mixture with a pyrethrum emulsion as a larvicide. The latter is no more efficient than the former costs much more and in the work reported killed numerous invertebrate mosquito predators. BISHOP (p. 292) records observations made in the Tennessee valley, where there has been a change from river to lake conditions and where Paris green, larvicide oil, and pyrethrum larvicide have been used in mosquito control. The effects of these on fish, aquatic organisms and vegetation are mentioned.

TWEEDIE (p. 293) writes of the value of fascine drainage especially for rubber estates.

Malaria of monkeys and birds—By incubating *P. knowlesi* with the serum of human beings who had recovered from a *P. knowlesi* infection and by using normal serum as a control, and injecting these mixtures into monkeys, COGGESHALL (p. 293) has produced evidence of definite immune bodies in the serum of recovered patients, which rendered the parasites almost or completely harmless to the animals. Complement fixing antibodies were also found but were not apparently correlated with the protective action of the serum. SINGH and SINGH (p. 294) report success in the treatment of *P. knowlesi* infection in monkeys by means of immune serum from chronically infected animals. They (p. 294) show that *P. knowlesi*, *P. cynomolgi* and *P. fumi* produce immunity against reinfection with the same species, but not against each other in monkeys. They further (p. 294) found that only anti-*P. knowlesi* serum caused agglutination of red cells infected with that parasite.

From experimental work, SCHULEMAN and SPIES (p. 294) show that pigment free exoerythrocytic schizonts of *P. gallinaceum* which arise directly from sporozoites, like those which develop from pigmented erythrocytic forms are found in histiocytes. Further development is stated to take place either extracellularly or intracellularly giving rise to exoerythrocytic schizonts or to the ordinary pigmented stages found in red blood cells. HEYFITT (p. 295) concludes from his work on *P. calhemorum* that if exoerythrocytic schizogony is part of the life cycle of some avian parasites the factors governing its appearance are unstable. One strain of parasite may be associated with these bodies while they may be entirely absent in another strain.

HEGNER (p. 296) has found that *P. calhemorum* does not multiply in the blood of canaries to the extent which its normal merozoite production would imply and argues that an increasing percentage of parasites is destroyed each day indicating that immunity is acquired gradually.

C. H.

RAMAN (T. H.) *Plasmodium ovale* in India.—*Jl Indian Med. Assoc.* 1940 Sept Vol 9 No 12 pp 583-585 With 6 figs.

This is a description of a case of malaria and of the parasites found in the peripheral blood. The patient was infected somewhere in India. The author states that the parasite had all the appearances of *P. ovale*. The microphotographs produced do not justify a definite opinion. It was a mixed infection, as occasional crescents were found.

Norman H. Inle

WOLFF (E. K.) The Buffer Precipitation Test for Malaria (B.P.T.) adjusted for Large-Scale Examinations.—*Indian Med Gaz* 1940 Sept Vol 75 No 9 pp 517-519

The author's buffer precipitation test for the diagnosis of chronic malaria infection has already been described [see this *Bulletin* 1940 Vol. 37 p 57] A further simplified technique which gives satisfactory results is now described. Only two tubes are used for each test, one containing 1 cc of the test solution and the other 1 cc. of the control solution. These solutions are made up as follows —

Test solution

Stock buffer solution pH 7.7	one part
Glass-distilled water	four parts
Formalin	0.2 per cent.

Control solution

Stock buffer solution pH 7.0	one part
Glass-distilled water	four parts
Normal saline	five parts
Formalin	0.2 per cent.

Two drops of serum are placed in each tube. The reading may be done after the lapse of from half an hour to two hours and is based on the comparison of the two tubes. The reading is best done by daylight. The value of negative tests is high if the blood be taken at the right time, preferably in the morning before breakfast. The acute feverish period of a malaria attack should be avoided. N IV

REED (Alfred C.) The Treatment of Malaria.—*Jl Amer Med Assoc* 1940 Aug 24 Vol. 115 No 8 pp 602-605

This is one of a series of articles written by eminent authorities for the purpose of extending information concerning the official medicines. In it the treatment of malaria is adequately described in small space. Most attention is devoted to the use of quinine salts, plasmoquine and atabrin. Other drugs for which antimalarial properties have been claimed have not escaped notice and some useful information on symptomatic treatment is included. The author pays due regard to the importance of developing and maintaining immunity which is at times the best of all treatments but in *P. falciparum* infections there is constant clinical danger as long as the patient harbours plasmodia. With regard to the treatment of chronic malaria and malarial cachexia the author states. NOCHT and MAYER recommend a mixture of plasmochin and quinine sulfate for twenty-one days by mouth *three tablets after each meal*. Each tablet contains 0.01 gm of plasmochin and 0.03 gm of quinine sulfate. This appears to be a misprint: the words italicized should read *three to four tablets daily after meals* usually 3 tablets suffice [NOCHT B and MAYER M. *Malaria* John Bale, 1937 p 59]. Elsewhere in the article the author rightly insists that plasmoquine should never be given in a dosage exceeding 0.065 gm. (1 grain) by mouth a day. N IV

LYNCH (P. P.) & BRANDT (C. W.) Quinine Poisoning. Report of a Fatal Case.—*New Zealand Med Jl* 1940 Aug Vol 39 No 212. pp 191-194

A child one year and eight months old got possession of a bottle of quinine bisulphate tablets and swallowed a number. The total

In addition to the protection tests complement fixation tests were carried out. All convalescent sera tested gave evidence of the presence of complement-fixing antibodies but there was no uniform correlation between their titre and the protective action of the sera.

C M Weryon

SINGH (Jaswant) & SINGH (Harwant) *Passive Immunity in Monkey Malaria.*—*Jl Malaria Inst of India* 1940 June Vol. 3 No 1 pp 137-142 With 1 chart [14 refs]

Attempts were made to modify the course of *Plasmodium knowlesi* infections in *M. rhesus* by the administration intraperitoneally or intravenously of immune serum from chronically infected animals. Some monkeys which first received serum after the infection had become well established were successfully treated, but early treatment with relatively large doses commencing from the day of inoculation appeared to give better results.

C M W

SINGH (Jaswant) & SINGH (Harwant) *Observations on Immunity in Monkey Malaria as evidenced by the Results of Superinfections.*—*Jl Malaria Inst of India* 1940 June Vol 3 No 1 pp 99-114 [36 refs]

M. rhesus which had recovered from infections due to *Plasmodium knowlesi*, *P. cynomolgi* or *P. inax* were re-inoculated with one or other of these parasites at varying intervals. It was found that a chronic infection with any one of these parasites did not prevent or modify the course of reinfection with a different parasite but did prevent reinfection with the same parasite. In the case of *P. knowlesi* the immunity to reinfection appeared to diminish four months after disappearance of parasites from the peripheral blood. In the case of the other two parasites immunity was effective for at least 11 to 18 months.

C M W

SINGH (Jaswant) & SINGH (Harwant) *Agglutination Reactions with Plasmodium knowlesi.*—*Jl Malaria Inst of India* 1940 June Vol 3 No 1 pp 53-66.

A washed suspension of red blood corpuscles from *M. rhesus* infected with *Plasmodium knowlesi* was employed as recommended by EATON (1938) as an antigen in agglutination tests with sera from other monkeys which had recovered from acute infections with *P. knowlesi*, *P. inax* or *P. cynomolgi*. It was found that the *P. knowlesi* sera alone caused clumping of the infected red cells of the antigen. The intensity of the reaction depended chiefly upon the sensitiveness of the antigen and duration of the infection. Fresh antigens alone were suitable for the test as with keeping deterioration occurred.

C M W

SCHULEMANN (W.) & SPIES (K.) *Zu Ursprung und Entwicklung der pigmentfreien Formen der Malaria Parasiten* [Origin and Development of Pigment Free Forms of Malaria Parasites].—*Dtsch Med Woch.* 1940 Apr 12 Vol 66 No 15 pp 404-405

In a previous publication [this *Bulletin* 1941 Vol 38 p 35] the first author has shown that the cells which ingest colloidal palladium

and which are therefore histiocytes are those in which develop the exoerythrocytic schizonts of *Plasmodium gallinaceum* which are found to occur after injection of the pigmented erythrocytic stages of the parasite into fowls. The early stages of these schizonts appear to be identical with the first developmental stages of sporozoites as described by KIKUTH and MUDROW. The cells in which the sporozoites developed were designated monocyctic cells by these authors. It seemed to the authors of the paper under review of interest to determine the exact nature of these cells. Accordingly a technique devised by KRONO to produce local aggregation of histiocytes was adopted. This consisted in implanting under the skin of the wing of fowls sterile pieces of sponge which has the property of bringing about the required aggregation of the histiocytes. Eight to ten days after the operation a piece of the resulting growth is excised and examined. If it is found to consist chiefly of histiocytes a suspension of sporozoites in equal parts of chicken serum and 0.9 per cent saline is injected into the growth. Before this injection however a subcutaneous injection of either dianil violet BE or colloidal palladium is given. This has the property of blocking the histiocytes. At varying intervals after the injection of sporozoites portions of the growth are excised and teased and preparations made. These are stained by Giemsa stain. Twenty four hours after the injection four nuclear stages both intracellular and extracellular are found. After 40 or 65 hours beside the four nuclear stages which can still be detected are larger forms with large numbers of nuclei. This development is in agreement with the description of Kikuth and Mudrow. It was also noted that when these schizonts were intracellular the cells containing them included also granules of the dianil violet or palladium. There can thus be no doubt that the pigment free exoerythrocytic schizonts which arise directly from sporozoites like those which develop from the pigmented erythrocytic forms when these are injected into fowls are contained in histiocytes. According to MISSIROLI between the actual sporozoites and the small four nuclear stages there are earlier developmental extracellular forms. Further development takes place either extracellularly or intracellularly. The intracellular development is either in histiocytes giving rise to the well-known pigment free exoerythrocytic schizonts or in erythrocytes when the pigmented stages are formed. The authors state that they are carrying out further studies by means of sections in place of smears in order to determine the exact position of the developmental forms in relation to the cells.

C M W

HEWITT (Redgmal) Exo-Erythrocytic Bodies in Canaries Infected with a Mexican Strain of *Plasmodium cathemerium*—*Amer J Hyg* 1940 May Vol 31 No 3 Sect C pp 61-66 With 2 figs [16 refs]

The paper reports that *Plasmodium cathemerium* was discovered in the blood of a finch purchased in Mexico City. A canary was inoculated with blood from the finch an infection resulting. On the ninth day the organs of the canary were examined for exoerythrocytic bodies but none was found. They were found however in large numbers in the spleen liver and bone marrow of one of two canaries infected

from the first canary. From the bird which showed the exoerythrocytic bodies four other canaries were inoculated but only two of these were positive for the bodies. In one of the negative birds, however, a parasite which has been variously styled haemogregarine or toxoplasma was found in monocytes in the liver and spleen. Though the parasite was of the same type as one which had been found in the original finch which harboured the malarial parasite, it is concluded that the infection in the canary had not originated from that of the finch but had been present before it was inoculated with the malarial parasite. The author remarks that if the exoerythrocytic schizogony is part of the life cycle of some avian malarial parasites the factors which govern its appearance are evidently unstable. It is noted that such schizonts have never been found in another strain of *P. cathemerium* which has been carried through hundreds of passages since 1936. A particular search for them has been made without result in organs of 150 of the birds. It seems that one strain of a parasite may be associated with the bodies while in another strain of the same parasite they are entirely absent.

C M W

HEGNER (Robert) A Note on the Development of Acquired Immunity in Avian Malaria.—*Amer J Hyg* 1940 July Vol 32 No 1 Sect C pp 24-26 With 1 fig

Working with *Plasmodium cathemerium* in canaries, the author has found that according to the average number of merozoites produced at schizogony which is 13 there should be, theoretically, a thirteen-fold increase in the number of parasites in the blood each day. This is far from being the case, for if a sufficient inoculation of infected blood is injected into a canary to give rise to the immediate presence of parasites in the blood on the following day there may be 60 parasites for every 10 000 red cells. On the next day the figure has risen to only 410 instead of to 780 (60×13) and on the succeeding day to 800. It is thus observable that an increasing percentage of parasites is destroyed each day as shown by such a series of percentages as 47.7 85.0 89.5 94.4 91.5 94.8 96.5 97.8—a sequence of events which indicates that the immunity is acquired gradually and does not appear suddenly at the crisis. Human and monkey malaria appears to be similar to that of birds in this respect.

C M W

TROPICAL DISEASES BULLETIN

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[No 6

SUMMARY OF RECENT ABSTRACTS *

V LEISHMANIASIS

VISCERAL

Epidemiology

MATTEI *et al* (p 349) report two cases of kala azar in adults in Corsica, where the disease is usually only found in children. They suggest that the disease in adults may be more common than has been suspected. The village from which one of these patients came was known to be an endemic focus of infantile and canine kala azar and a dog belonging to the patient was diagnosed as suffering from the disease. The patient stated that she had been bitten by a tick and the authors maintain that these facts support their contention that the dog is a reservoir and the tick the vector of the disease. CELIK (p 767) also reports kala azar in an adult (the first recorded case) from an area in which it is endemic in children in Turkey.

MORNET (p 768) records the first discovered case of kala azar in a dog in the Niger territory though a number of cases have been seen in Dakar. MALBRANT (p 768) has reported the first three dogs found to be infected with kala azar in Brazzaville.

Aetiology

ALEKSEJEV and KOVAKHOV (p 345) find no evidence of multiplication of leishmania other than by binary fission after the destruction of the macrophages which have engulfed them. They regard *Leishmania donovani*, *L. infantum* and *L. tropica* as "good species" on epidemiological but not on morphological grounds.

ADLER (p 768) inoculated 5 patients who were suffering from inoperable carcinoma with massive doses of cultures of *L. donovani*:

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

only one patient became infected, and though the infection was heavy no symptoms of kala azar developed during a period of 9 months observation.

WANG and CHUNG (p. 769) found that susceptibility to intraperitoneal injection of culture forms of *L. donovani* was increased in hamsters by splenectomy or by the injection of benzol and olive oil before the injection of the flagellates.

CHUNG and WANG (p. 769) report work in which infection with *L. donovani* in hamsters, cured by neostibosan, appeared to give protection against subsequent infection with *L. canis* from a naturally infected dog. This suggests that human and canine strains in N. China are either identical or closely related. [There is increasing evidence that in N. China, as in the Mediterranean, the dog is the reservoir host of the human disease see this *Bulletin* 1940 Vol. 37 p. 339.]

TRANSMISSION.

SMITH *et al.* (p. 769) show that when *Phlebotomus argentipes* were offered a blood meal 10 days after an infective meal, some of the flies made unsuccessful attempts to suck blood. Dissection of these flies showed that, as in the case of flies infected with plague bacilli, there was complete blockage of the oesophagus and it would seem probable that in the efforts to feed some of the flagellates must be dislodged and could then readily pass into the skin. The authors have found that flies are kept alive after an infective feed more readily by allowing them to feed on raisins than by giving them successive blood meals and these observations may afford a clue to the reason why it has been so difficult to transmit infection by flies which have been given repeated blood meals.

KIRK and LEWIS (p. 770) show that of the 13 species of *Phlebotomus* recorded from the Sudan, *P. langeroni* var. *orientalis* is the only member of the "major group" and that all the places in which it has been found are within the area in which kala azar is endemic. It may be found as far as 5 miles from human habitations.

YUAN *et al.* (p. 346) show that in children in N. China infection appears to take place in the early summer months, a period which corresponds to the greatest incidence of *Phlebotomus chinensis* specimens of which were found to be naturally infected during June and July in kala azar houses.

JOYEUX and SAUTET (p. 346) give reasons for the supposition that under certain conditions the dog louse *Linognathus setosus*, may be able to transmit kala azar from dog to man.

Pathology

At post mortem examination of patients (suffering from inoperable carcinoma) who were given massive injections of kashinania, ADLER (p. 768) found two types of cell infection. In one the cytoplasm was filled with parasites (lupffer cells and splenic reticular cells) in the other the parasites were few (arterial adventitia cells, Ghacon's capsule and others). Though the cells of the first type were filled with parasites they were still capable of phagocytosis. DHAR (p. 348) has found that pneumonia is a much more serious disease in persons with kala azar than when it attacks healthy persons. He considers that this is probably due to the loading of the reticulo-endothelial system by the

parasites Treatment of the underlying condition is important. MURANO and VECCHIO (p 348) have found that in rabbits with a blocked reticulo-endothelial system the serological response to injections of typhoid vaccines is better than in normal controls and that the same is true of children with kala azar in whom the reticulo-endothelial system may be presumed to be hypertrophied and blocked with leishmania. The authors consider that these facts support the view that immune bodies are products of the cells of the reticulo-endothelial system and that they are increased in leishmaniasis because of the hypertrophy and hyperplasia of the histioid cells of that system Expanding this point in infantile kala azar MURANO (p 770) states that his work indicates that increased production of complement is associated with hyperplasia of the histiocytes but that leucocytes do not play any part since there is no relationship between the amount of complement and the number of leucocytes present in the blood An increase in complement therefore does not mean an increase in the defensive mechanism of the body which in kala azar is very susceptible to intercurrent infections.

BOTZARIS (p 347) has studied the blood changes in infantile kala azar in Greece

Clinical

KIRK and SATI (p 771) find that in the Sudan superficial skin papules or ulcers containing leishmania are often seen in kala azar Leishmania are rare in blood smears but the authors found them in gland puncture material in each of 30 consecutive cases. In recording this important finding they describe in detail the technique used the glands along the saphenous vein are punctured with a dry hypodermic needle without a syringe and the juice which enters the needle is blown on to a slide and stained

NAPIER (p. 349) discusses the diagnosis of kala azar in dispensary practice Spleen puncture is the best method for discovery of the parasites. If parasites cannot be found and serological tests are doubtful and do not show signs of becoming positive after one month the case is probably not one of kala azar In N China YOUNG (p 771) found spleen puncture to be almost invariably positive in kala azar liver puncture is useful also but the search for parasites in nasal mucus was negative in 26 cases examined He points out that in making smears the heavily infected cells tend to break and the leishmania to be set free

BRUMPT (p 772) on the other hand points out the advantages of sternal puncture over spleen puncture in the diagnosis of kala azar it is easy and almost painless it is not dangerous and can be frequently repeated the cell picture gives information of value in prognosis In kala azar he found the average myelogram picture to be—granulocytes 23 per cent, erythroblasts 24 hyaline leucocytes 53 per cent Normally the granulocytes are 4 times as numerous as the erythroblasts and 3.5 times as numerous as the hyaline leucocytes. POPOTAS (p 772) in Greece also writes of the value of sternal puncture which he has used with success when spleen puncture and serum reactions were negative. REDDY and SUBRAMANIAM (p 349) however consider that negative sternal puncture does not exclude a diagnosis of kala azar MATTEI *et al* (p 349) record a case of adult kala azar in

Congica (where only the infantile form is commonly reported) which was diagnosed by the finding of leishmanias in sternal puncture material. Serological tests were also positive.

HCANG (p 773) describes a series of cases of agranulocytosis with sudden fall in the number of granulocytes, and with throat or skin lesions. In some the cause was kala azar in others the condition was due to antimony treatment. The condition due to antimony appears to be more severe than that due to kala azar. Neostibosan and urea stibamine were the drugs responsible and it is suggested that antimony intoxication induces a sudden change in the number of granulocytes and that this favours the development of the acute condition. A platelet count of over 100 000 appears to be a favourable sign, and for treatment the drug of choice is pentosticotide. Relapse may occur in the kala azar cases, so that antimony treatment should be resumed as soon as possible to prevent such recurrences.

WANG (p 773) reports from China a case in which subcutaneous nodules, consisting of reticulo-endothelial cells and lymphocytes with many leishmanias, were found. A large amount of urea stibamine was needed in treatment.

Treatment

In children undergoing treatment with tartar emetic for kala azar VICCHIO (p 350) noted that soon after the drug was commenced there was an increase in the lymphocytes of the blood, with a decrease in the neutrophils and red cells. Bilirubinæmia was increased and reticulocytes became more numerous. These changes quickly passed off.

ROGERS (p 350) states that with neostibosan and solustibosan a cure rate of over 90 per cent can be expected in India, but that these drugs are too expensive for the villagers. If a cheap and efficient drug were produced and used on a large scale kala azar in India could be reduced to small proportions. SIVA (p 775) also shows that in China the successful treatment of kala azar is related to the cost of the pentavalent antimony compounds. A new drug named Distibetyl has been prepared and is apparently as efficacious as other preparations but is cheaper. Details of dosage are given.

BHATTACHARYA (p 774) refers to alarming symptoms of an anaphylactic character which sometimes appear after the injection of pentavalent antimony compounds. These can be diminished by slow injection using drugs, which are not too old, dissolved in double-distilled water and by keeping the patient lying down for half an hour after administration. Adrenalin, ephedrine or pituitrin may be given if the reactions are severe.

HORGAN and KIRK (p 774) referring to the paper by ROGERS point out the important fact that although antimony is highly successful in India, China and the Mediterranean, this is by no means true in the Sudan, where relapses after such treatment occur in a considerable proportion of cases. When relapse occurs there appears to be considerable resistance to further antimony treatment so that the majority of relapse cases terminate fatally. (In this connection later work indicates that 4-4-diamidino stibene is successful in the treatment of kala azar in the Sudan. It may be that this drug is effective in antimony resistant cases. See this Bulletin 1941 Vol 38 p. 261.]

ADAMS and YORKE (p 775) report cure by 4-4-diamidino stilbene of an Indian with 8 intravenous doses of 1.0 mgm. per kilo repeated daily. A total of 360 mgm was given. ADLER and RACHMILEWITZ (p 776) report a case of Mediterranean kala azar in which there was relapse after a course of stibamine which was treated with 4-4-diamidino stilbene with apparently excellent results. Intravenous doses of 60 to 100 mgm and intramuscular doses of 100 mgm were given. ADLER and TCHERNOMORETZ (p 775) write of the marked curative effect of 4-4-diamidino stilbene in kala azar of hamsters. Doses of 2.5 to 40 mgm. per kilo were given repeatedly.

CUTANEOUS (ORIENTAL SORE)

Oriental sore has been reported from the Southern Oranais district of Algeria and from Philippeville on the Mediterranean coast (RAMEZ GUIGON p 351).

DUBOVSKOJ (p 351) has cultivated *L. tropica* directly from human sores in Bianchi's medium which is described. Incubation is at 20-22°C. SENEKJI (p 351) describes the standardization of saline suspensions of culture forms of leishmania. He notes the biochemical reactions of *L. tropica* in cultures. He (p 779) has tested the effects of various drugs on the flagellate forms of *L. tropica* in cultures. Trypaflavin, euflavin, rivanol and the green and violet dyes are the most actively lethal, but sulphanilamide has little action.

FLARER (p 776) concludes as a result of observations on smear preparations from oriental sore that true schizogony takes place in the reproduction of leishmania, though he admits that the normal process is one of binary fission. In comment WENYON points out that in making smears the cells containing the parasites suffer damage and that small portions of broken-off cytoplasm containing a small number of parasites may easily give the impression of multinuclear forms. Reliable conclusions cannot therefore be drawn from smears and it would be safer to study tissue sections.

VANNI (p 352) found one specimen of *Phlebotomus macdonicus* infected in nature with leptonads (probably developmental forms of leishmania) in the Abruzzi district of Italy by the method of serial sections. In all 1600 were thus examined. Infection was also found in a batch of 200 flies which were ground up and injected into rats. He considers this sandfly to be the vector in this area. On the Adriatic coast of Italy he (p 779) finds a definite association between oriental sore and *P. perfilovae* (*P. macdonicus*) and there is little doubt that this sandfly is the vector. It breeds in dung heaps and it seems that the incidence of the disease is in direct relationship to the proximity of these heaps to the human habitations. In one province dung heaps are prohibited within 80-100 metres of houses and oriental sore is practically non-existent though the vector is present. Prevention therefore should include removal of dung heaps from the vicinity of houses as well as protection by nets, treatment and education.

TRIFILÒ (p 777) reports an oriental sore on the tongue of a patient in Entrea.

BERLIN (p 777) describes a condition in which in the scar tissue of healed oriental sore there appear small round papules resembling lupus vulgaris. In some of these leishmania have been found probably enclosed in scar tissue during the healing of the original sore. These papules produce no symptoms and disappear spontaneously leaving

variolliform scars. In one case papules also appeared on the extremities away from the original sore. These were probably due to leishmaniasis, though leishmania could not be found in them.

AKRAWI (p 779) treats oriental sore in Baghdad by local applications of M & B 683 or Uleron, and reports 63 per cent of cures within a month with good scar formation. This result is claimed to be better than those obtained with other forms of treatment.

MUCO-CUTANEOUS (AMERICAN)

VILLELA (p 352) has found mucosal leishmaniasis to be about nine times as common in men as in women in São Paulo. In a large proportion the lesions are limited to the nasal mucosa and in many instances these lesions appear after skin lesions have healed. In some cases the nasal lesions develop before the skin lesions, and this would indicate that sandflies may feed inside the nose a habit which has so far never been recorded. On the other hand it may be that the nasal condition is secondary to some latent skin infection which is not detected until the nasal lesion has developed. VILLELA *et al* (p 353) have found leishmania in scrapings from the apparently normal nasal mucosa of patients with cutaneous leishmaniasis in Brazil. This deposit of leishmania may probably lead to nasal lesions and the treatment of cutaneous disease should include intravenous antimonials which are capable of destroying parasites in the nasal mucosa. The usual treatment of skin lesions with arsenphenamine is not enough to eradicate the nasal infection.

PESTANO and PRISOLA (p 776) describe cutaneous leishmaniasis from São Paulo and point out that the disease is associated with distinct monocytosis.

GOMES (p 778) found the intradermal reaction of Montenegro to be strongly or moderately positive in 97.5 per cent and weakly positive in 2.5 per cent of cases of S. American cutaneous or mucocutaneous leishmaniasis. The antigen used is a suspension of washed flagellates in physiological saline containing 0.4 per cent. phenol. The antigen can be kept for long periods in the ice box with little loss of potency.

Charles Wilcocks

TRYPANOSOMIASIS

PRECIS OF ABSTRACTS IN THIS SECTION

SALEUX (p 304) shows that in French Equatorial Africa during 1939 the percentage of new native cases discovered in an early stage of the disease was 39.1 the percentage of cases in the nervous stage was 60.8. The various methods of examination, which are set out in detail, are complementary and reliance should not be placed on one

method only bone marrow puncture cannot replace the older methods. Treatment was much more effective in the early than in the late cases. Details are given of the present condition of patients treated up to 10 years ago. The author concludes that if immunity is provoked it is of short duration only.

HAWKING (p 306) has confirmed the finding of YORKE *et al* that *T. rhodesiense* as it occurs in the original host is resistant to human serum but that it becomes sensitive on passage through laboratory animals.

TEESDALE (p 306) has found the proportion of fertile female *G. palpalis* to be found equal in blocks of riverine bush in Kenya in spite of the fact that the fly density in these blocks though low is not equal. There is therefore no evidence that the remaining fly population is likely to die out of its own accord when reduced to a low level since there is no indication that males and females are finding difficulty in meeting. In a study of *Glossina morsitans* in Tanganyika Territory JACKSON (p 307) has found that the flies are confined by the vegetational types to certain habitats and do not usually stray from them. The length of life of male flies was studied, it is longest in the rainy season since many die of starvation in the dry season when frequent feeds are necessary. Females move more extensively through the savannah than males, and probably live longer. JACK (p 307) has discussed the behaviour in the field of *G. pallidipes* and *G. brevipalpis* comparing these flies with *G. morsitans*. The findings cannot well be further abstracted, but include remarks on feeding preferences, results of trapping, state of hunger at the time of death and the effects of humidity and heat.

BOWESMAN (p 310) reports on 4,4'-diamidino stilbene in treatment in the Gambia. On intravenous injection there may be somewhat alarming symptoms which however soon pass off. The drug may also be given intramuscularly a useful point in the treatment of children. It produces rapid amelioration of the symptoms and signs of sleeping sickness but is not suitable in cases in which the protein content of the cerebrospinal fluid is above 0.05 per cent. The treatment can be carried out in half the time necessary for trypanamide eye symptoms and albuminuria are not produced.

After observing for two years patients treated with neocryl ACRES (p 311) concludes that in an early stage of the disease this drug compares favourably with trypanaryl but in the later stages is much inferior to it.

HAWKING (p 312) has investigated the trypanocidal activity and arsenic content of human blood and cerebrospinal fluid after the administration of trypanamide.

FRANKS and FISHER (p 313) report two cases of dermatitis which followed arsenamine treatment and which recurred (an unusual happening) on the institution of trypanamide therapy.

CULBERTSON (p 314) has found that mother rats immunized by the injection of a formalized suspension of *T. lewisi* transmit their immunity to their young through the milk as in the case of rats which have recovered from a *T. lewisi* infection. Any immunity acquired by the young through the placenta is largely lost within a few days after birth.

HOARE (p 314) shows that in trypanosomes the kinetoplast may be absent without impairment of the vital functions. The akinetoplastic condition may be interpreted as a mutation depending upon

changes in the chromosome constitution, or as cytoplasmic inheritance, independent of the nucleus. He details the conditions under which absence of the kinetoplast may be found.

Chagas's disease—MAZZA (p. 315) gives a list of animals found infected with *T. cruzi* in nature in certain provinces of the Argentine.

MAZZA and FREIRE (p. 316) report two cases of inoculation chagoma and describe the biopsy findings. MAZZA and URCELAY (p. 316) describe a further inoculation chagoma and a morbilliform rash in a child, and enumerate other skin lesions found in Chagas's disease. MAZZA and MIRARA (p. 317) also describe the same condition (without the rash) in an adult. Stained biopsy specimens revealed leishmanial forms of *T. cruzi*. MAZZA *et al.* (p. 317) describe a child with secondary chagomata which were widely distributed over the body. As in one of the other cases reported, the preparation Bayer 7602 appeared to cause rapid improvement. MAZZA *et al.* (p. 318) describe the pathological histology of the chagomata which result from the cutaneous inoculation of *T. cruzi* and refer to six cases in children and one in an adult. Several of these patients showed great improvement after treatment with the preparation Bayer 7602.

MAZZA and JORG (p. 318) have produced in a dog nodules indistinguishable from those of Chagas's disease by the injection of products of disintegrated *T. cruzi*. These products had been filtered through a Berkefeld V filter and were capable of producing the Schwartzman phenomenon. C IV

COOK (Albert) **How Sleeping Sickness came to Uganda**.—*East African Med J* 1941 Jan. Vol. 17 No. 10 pp. 408-413

In this address the author gives an interesting popular account of the history of sleeping sickness in Uganda. It contains nothing new. W. 1 orks.

--- BAZZAVILLE AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1939 (SALEUM (G.)). pp. 75-97.—Service de la surveillance de la maladie du sommeil [Sleeping Sickness Service.]

During the year 1939 only a single case of sleeping sickness was found among the 438 Europeans examined. The number of new native cases discovered was 215. In addition, 645 old cases have been kept under observation and of these 160 were discovered more than 10 years previously and 126 more than 5 years previously and 359 less than 5 years previously.

Fifteen old European cases have remained under observation and all have enjoyed excellent health. Details are given regarding the new case discovered during the year.

Information is given regarding the origin and condition of the 215 new native cases. 39.1 per cent. wrongly given as 39.7) were in early stage of the disease and 60.9 per cent. were in the nervous stage. These cases were discovered either by itinerant missions or because they had come to dispensaries with suspicious signs. In all 10

natives were examined for sleeping sickness during the year. The following table shows the method of examination which resulted in the discovery of trypanosomes —

Presence of parasite.	No. of positive cases
Gland juice alone	51
Thick blood film alone	1
Thick blood film + triple centrifugation	8
Gland juice + lumbar puncture	19
Thick blood film + lumbar puncture	1
Thick blood film + triple centrifugation + lumbar puncture	6
Gland juice + thick film + triple centrifugation	55
Gland juice + thick film + triple centrifugation + lumbar puncture	32
Lumbar puncture alone	43
	215

The various methods of examination are hence complementary and it would be futile to rely on one only. The relatively large number of cases discovered by lumbar puncture when all other methods of examination had failed is worthy of note.

Among the 84 new cases in the first stage of the disease treatment resulted in 72 blood sterilizations, 5 blood relapses, 3 nervous evolutions and 4 deaths. Among the 131 with nervous signs and changes in the spinal fluid, treatment gave good results in only 70 with return of the spinal fluid to normal.

The 160 cases discovered more than 10 years previously were all negative when re-examined during 1939. Of the 852 patients diagnosed between 1929 and 1933, 126 were re-examined during the year in question and 115 were found to be definitely cured, 9 to exhibit evidence of nervous evolution necessitating further treatment and 2 to be infected. These 2 cases were undoubtedly re-infections as frequent examination in previous years had shown them to be cured. Of the 970 cases diagnosed between 1934 and 1938, 359 were re-examined in 1939 and 273 found to be cured, 7 to have blood relapses, 78 to show signs of nervous evolution and 7 to have been certainly re-infected [but these add up to 365].

The question whether re-infection is common receives consideration but it is for obvious reasons difficult of solution. The author concludes however that notwithstanding the fact that it is rarely proved, immunity either does not occur or if it does is not of long duration in a person recovered from a previous infection. Details are given regarding 29 fatal cases—12 recently discovered during 1939 and 17 amongst old cases.

The last portion of the paper is concerned with the value of bone marrow puncture as a diagnostic measure [this *Bulletin* 1939 Vol. 36 pp. 216-217]. Of 6 patients with peripheral infection, 3 showed trypanosomes in the bone marrow, of 7 patients in the stage of meningeal reaction, 5 showed a positive bone marrow and of 4 in the nervous stage, 3 had a positive bone marrow. Thus of 17 cases shown to be positive by the ordinary methods, 11 (65 per cent) were found to be

positive by bone marrow puncture. Obviously then, this measure cannot replace the older methods of diagnosis and must be reserved for special cases. W Y

DUREX (A.) La lutte contre la maladie du sommeil au Congo Belge et au Ruanda Urundi. (The Fight against Sleeping Sickness in the Belgian Congo and Ruanda Urundi).—*Rev pour l'Etude des Calamités* 1940 May-Dec Vol. 3, Nos 10-11 pp 157-163 With 1 map

This short article gives a semi-popular account of the disease and of the methods of combating it. In two interesting tables are shown the number of people examined, the number of old cases still under treatment, and the index of new infection for each year between 1928 and 1937 in the Belgian Congo and Ruanda Urundi respectively. The general conclusion is that although sleeping sickness which is not combated is a calamity this is not the case if the disease is attacked energetically. W Y

HAWKING (Frank) Serum Resistance of *Trypanosoma rhodesiense* taken directly from Human Blood.—*Jl Trop Med. & Hyg* 1940 Nov 1 Vol. 43 No 21 pp 255-257

This note describes the resistance to human serum of two strains of *Trypanosoma rhodesiense* observed in their original host (man) and in subsequent passages through rats. When examined *in vitro* these trypanosomes were wholly or partially resistant to serum taken from the patients or from a normal individual. This resistance was lost on passage of the strains through rats. These observations confirm the views of FORKE, ADAMS and MURGATROYD (this Bulletin 1930 Vol. 27 p 804), that the trypanosomes of *rhodesiense* sleeping sickness as they occur in the original host are resistant to human serum but that they become sensitive on passage through laboratory animals.

Hawking notes that the trypanocidal activity of the serum of one of his patients was equal to that of a normal individual. The activity of the serum of the other patient seemed somewhat less. W Y

TEESDALE (C.) Fertilization in the Tsetse Fly *Glossina palpalis*, in a Population of Low Density.—*Jl Animal Ecology* 1940 May Vol 9 No 1 pp 24-28

This paper deals with the question whether when the great majority of tsetse have been removed from an area the small number left will increase and re-populate the district, or whether the fly will die out.

Glossina palpalis was formerly very common in the riverine bush on the Kuja river and its tributaries in the South Kavirondo district of the Vyanza Province Kenya, but it has been practically eliminated over much of this area. The density of the fly as measured by fly rounds, has been reduced from 100 to 200 tsetse per fly-boy-day to about 1 per F B D. This result has been obtained by using the "Block" method. The riverine bush has been divided into blocks up to several miles long by making clearings of about 1 000 yards wide. In each block the flies have been almost eliminated by hand-catching squads of catchers having patrolled the blocks regularly and caught enormous numbers of tsetse.

It was suggested by K. MELLANBY that some idea of whether a sparse population of tsetse is likely to maintain itself may be obtained

by examining the spermathecae of the females captured. Flies caught in the six blocks on the Kuja river or its tributaries were examined. At first all females caught were dissected but later it was found impossible to do this and 1737 out of a total of 2956 females were examined.

The results of the dissections are summarized in a table which shows that the percentage of infertile females is approximately the same in each of the six blocks there being no evidence that a higher percentage of infertile females was to be found in the more sparsely populated areas.

The following summary is given —

Even when a population of the tsetse fly *Glossina palpalis* has been reduced to a low level there is no indication that the males and females are finding difficulty in meeting. There is therefore no evidence that the remaining tsetse population is likely to die out of its own accord.

W. I.

JACKSON (C. H. N.) The Analysis of a Tsetse-Fly Population.—*Ann. Eugenics* 1940 Dec. Vol. 10 Pt. 4 pp. 332-369 With 4 figs.

The author has continued his studies of populations of *Glossina morsitans* in Tanganyika Territory. Flies are caught within a square with a side of 4 miles (subdivided into smaller squares) marked according to the date of capture, liberated and recaptured at intervals thereafter. From the recaptures it is possible to estimate population, death, emergence and migration. The careful statistical analysis needed to give reliable results is fully explained. Most of the captured flies are males so that the conclusions relate almost entirely to these. It is shown that about one-quarter of the male flies within the 4 mile square leave the square each week. But the majority of these have returned a week later, only about 3 per cent are permanently lost each week. The explanation appears to be that the flies are confined by the vegetational types to certain ambits and only rarely do they stray from one ambit to another. In this way the male flies are generally prevented from moving more than about half a mile in one direction. The length of life of male flies ranges from 2-6 weeks (average 4 weeks) throughout the year, being longest in the rainy season. A few individuals will survive 8 or 12 weeks at any season. In the dry season many die of starvation for at this time they need frequent feeds and death being due to chance the expectation of life is approximately equal at any age. In the dry season (in an area where fire was excluded for a year) the population fell, because of a fall in the emergence rate, it rose again during the rains when emergence became normal and life became longer. The females move more extensively through the savannah than the males, they probably live longer.

I. B. Wigglesworth

JACK (Rupert W.) Notes on the Behaviour of *Glossina pallidipes* and *G. brevipalpis* and Some Comparisons with *G. morsitans*—*Bull. Entom. Res.* 1941 Jan. Vol. 31 Pt. 4 pp. 407-430 With 7 figs.

The author states that the serious situation created by the continued incursions of *Glossina pallidipes* and *G. brevipalpis* from

Mozambique Territory into the farming area of the Southern Mchetter district in Southern Rhodesia has necessitated increased attention to these species.

Notes of interest on behaviour in the field, more especially of *G. pallidipes* have been obtained, thanks to the courtesy of the Governor of Mozambique who granted permission to Rhodesian entomologists to carry out investigations on the Portuguese side of the frontier. The area examined was the tract of country through which the motor road runs from Mt Selinda in Rhodesia past Spungaberra to the Gogoio Mission some 20 miles over the Portuguese border.

The author gives the following summary of the interesting observations recorded in this lengthy paper —

1 *G. pallidipes* almost invariably attacks man on the leg from the knee downwards.

2 *G. brevipalpis* may attack man anywhere and not infrequently on the head.

3 Both species fill themselves readily with human blood once an attack has been made.

4 Neither sex of either species attacks man unless very hungry as indicated by the very low mean fat content in the captures.

5 *G. brevipalpis* is apparently more reluctant even than *pallidipes* to attack man and the fat contents in flies caught on man are proportionally lower than in the case of *pallidipes*.

6 Neither sex of *pallidipes* is attracted to a donkey unless hungry & ready to feed.

7 Male *brevipalpis* are apparently attracted to a donkey whether hungry or otherwise but the females only when hungry. In this respect *brevipalpis* appears to resemble *moritatus*.

8 Both *brevipalpis* and *pallidipes* are very weakly attracted to a moving motor vehicle compared with *moritatus*.

9 It appears that males of both *brevipalpis* and *pallidipes* may be attracted to a moving motor vehicle when moderately fat, but the position in regard to the females is uncertain.

10 A grey blanket screen carried between two natives attracted *pallidipes* moderately and *brevipalpis* poorly.

11 *G. pallidipes* of either sex almost invariably settled on the bottom edge of the screen, whilst *brevipalpis* alighted anywhere on the side and not infrequently on the top bar level with the shoulders of the bearers.

12 The mean weight of fat in male *pallidipes* caught on the screen was rather lower than in the case of males caught on a donkey. In the case of the females, the mean weight of fat was the same in respect of both attractants.

13 Traps, more or less of the Harris type, but frequently with black cloth in place of beaman, caught a large number of *pallidipes* but very few *brevipalpis*.

14 Analysis of large numbers of trapped *pallidipes* revealed the fact that the mean fat content of the males was low while the mean fat content of the females was much higher than in the case of females caught by means of any other attractant.

15 Of the trapped female *pallidipes* 14.5 per cent were in advanced pregnancy as against only 2.4 per cent in the case of females of this species caught on a donkey.

16 The proportion of female *pallidipes* caught in the trap was 61.20 per cent (2,430 flies).

17 In the case of the few *brevipalpis* caught in the traps the returns of fat also averaged high in the females and low in the males but the numbers were too small for any reliable deductions.

18 It was judged from general observations that most *pallidipes* entered the traps between 4 p.m. and 5.30 p.m. dependent, however upon the weather.

19 The most effective positions for the traps appeared to include those in which they received the rays of the sun in the later afternoon.

20 Further collections of *bruvipalpis* males off the road in the late evening confirmed the fact that such males are mostly recently fed and fat.

21 Comparative tables are given showing the dry weight weight of fat and stage of pregnancy in groups of *pallidipes* caught by means of different attractants.

22 It is probable that in the tables in the previous paper on *morsitans* many small 2nd stage larvae *in utero* were classed as 1st stage. The classification of 2nd and 3rd stage larvae in these tables refers to larvae 2 mm or more in length and the significance of the tables is not affected.

23 The figures given in Table XLIX in the paper on *morsitans* which indicate a low proportion of 2nd and 3rd stage larvae in females caught on man are of no significance as indicating reluctance of this sex to come to man. The last meal before larviposition appears normally to be taken when the larva is in the early 2nd stage.

24 The capture on a host of any considerable proportion of females containing advanced larvae does not indicate a thriving tsetse community but betrays insufficient opportunity of feeding in the locality concerned.

25 Methods of estimating the state of hunger at the time of death in the case of dry tsetse flies are discussed.

26 Tables are given indicating the respective responses of *morsitans pallidipes* and *bruvipalpis* of both sexes to various attractants and also roughly the proportion of the sexes in normal catches on these attractants.

27 It is remarked that no effective attractant for non hungry *pallidipes* males has so far been found.

28 It is shown that there are certain consistent differences in the proportion between the mean weight of fat in the males and females respectively in catches of the different species on different attractants. If the female fat is expressed as percentage of the male fat the lowest figure refers to *morsitans* caught on man whilst the highest refers to *pallidipes* caught in the traps.

29 Whilst in the case of both *morsitans* and *pallidipes* the traps tested have caught only lean (including young) males, but females in all stages of nourishment, young females seem to be inadequately represented in the catches of both species.

30 Figures obtained with *morsitans* indicate that the failure of the fat males and young females to be caught is due less to failure to be attracted to the outside of the traps than to failure to enter.

31 Under humid conditions relatively few lean *pallidipes* females of any age were caught in the traps whereas under hot dry conditions old lean *morsitans* females were caught in considerable proportion. This is possibly due to the fact that in hot dry weather a low fat content is commonly associated with a reduced water content, but not necessarily in humid weather.

32 The figures indicating the alimentary condition of *pallidipes* caught in the traps are judged to support the view that hunger is not the primary stimulus leading to the attraction and capture of the flies.

33 In connection with the fact that only blood-sucking flies are caught in numbers in these traps there are some indications that certain blood-sucking insects are more susceptible to heat than related vegetable feeders but the question needs further investigation.

34 The fact that the traps catch flies only within a certain range of alimentary condition reduces their value as a barrier against fly movements.

35 The fact that well nourished heavily pregnant females are caught freely in traps erected in the open shows that such females must move about relatively freely.

"38. A cheap form of tsetse trap is described, and some notes on trapping results are included."

[See also this Bulletin 1940 Vol. 37 pp 400-699]

BOWESMAN (C) A Short Report on the Use of 4,4-Diamidino Stilbene in the Treatment of Human Sleeping Sickness.—*Ann. Trop. Med. & Parasit.* 1940 Dec 31 Vol. 34 Nos 3 & 4 pp 217-220

In this paper the author records his observations on the treatment of human trypanosomiasis in the Gambia with 4,4-diamidino stilbene this Bulletin 1940 Vol. 37 p 404. The drug was given intravenously in doses of 1 mgm per kilo of body weight twice weekly. The first set of cases were treated in hospital and were kept under very close observation, but later cases were treated as out-patients in country districts. Some of the patients received 7 injections and others 10.

Bowesman states that the drug when administered by the intravenous route is somewhat upsetting to the patient for the first two or three injections. Headache, sweating, tachycardia, vomiting or retching may occur and there may be weakness of the pulse associated with a marked fall in blood pressure. The symptoms are of short duration and last only a few minutes but they may be rather alarming at the time. Some of the patients fainted, but they recovered quickly. After the first three injections, however, only transient headache occurred. If the patient is cold before being treated, the symptoms are much more likely to be severe.

The following routine was carried out in all cases. After clinical diagnosis blood examinations were made and these were followed by gland puncture and lumbar puncture. If these examinations confirmed the clinical diagnosis treatment was begun. Before the second injection blood examination and gland puncture were repeated and if either was positive the examinations were again repeated before the third injection, and so on until negative results were obtained. After completion of the course of treatment, another lumbar puncture was performed, and possibly a final lumbar puncture was carried out one year after the course of treatment. Although in a large number of cases this final examination could not be carried out, clinical reports were received of almost all cases.

Detailed results are shown in a table. The cases are arranged in six groups: (a) those treated with 4,4-diamidino stilbene with lumbar puncture performed before and after treatment and after an interval of a year; (b) those in which lumbar puncture was performed before and after treatment but not a year later; (c) those in which the patients died before the course of treatment was completed; (d) those in which they relapsed or did badly and were subsequently given a course of trypanamide; (e) control cases treated with trypanamide alone; (f) control cases treated with Bayer 205 alone.

The following are the author's conclusions—

"1. 4,4-diamidino stilbene is a water-soluble drug suitable for intramuscular or intravenous injection in the treatment of early cases of trypanosomiasis in human beings.

"2. The drug can be given in doses up to 1 mgm per kilo body weight. Larger doses are not altogether safe by the intravenous route.

3 Injection of the drug causes marked stimulation of the autonomic nervous system. The disturbance is temporary and no permanent harm results. The symptoms thus caused decrease with subsequent injections.

4 There is a rapid amelioration in all symptoms of sleeping sickness and physical signs improve quickly.

5 Cases in which the cerebrospinal fluid protein is above 0.05 per cent. are not suitable for treatment with 4,4-diamidino stilbene.

6 No eye-symptoms were complained of during treatment.

7 The drug does not cause albuminuria.

8 Diamidino stilbene has an advantage over trypanamide in the treatment of early cases of trypanosomiasis as treatment can be carried out in half the time necessary for treatment with trypanamide.

9 When injected intramuscularly the drug is not irritant and is very useful in the treatment of young children where the veins are small and difficult to enter. Intramuscular trypanamide is too irritant for the treatment of young children.

W 1

ACRES (Ian S.) Further Observations on the Treatment of Sleeping Sickness with Neocryl.—*Trans Roy Soc Trop Med & Hyg* 1940 Nov 30 Vol. 34 No 3 pp 281-289

In this paper the author records later observations made on a number of cases of sleeping sickness treated with neocryl in 1936-37 [this *Bulletin* 1938 Vol. 35 p 341]. It has been found possible to examine most of the cases periodically within the last two years and thus to compare the value of the drug with that of trypanarsyl (trypanamide). The dosage of neocryl corresponded closely with that used for trypanarsyl.

If when the treatment with neocryl was completed, gland examination was negative and the cell-count of the cerebrospinal fluid normal, the patient was told to report for further examination after 6 months. If however the cell-count of the cerebrospinal fluid was raised or if there was any doubt about the clinical condition of the patient he was told to report within a period of two or three months. If on control examination gland examination was still negative and the cell count of the cerebrospinal fluid normal then a further period of 6 months elapsed before the next control was made. A case which showed no sign of relapse and was in good condition at least two years after treatment was completed was considered cured. The results of this work are summarized in two tables viz Table A showing (1) the controls of cases which were cured by neocryl and (2) the earlier controls of those cases which relapsed after neocryl treatment and Table B showing the further treatment and controls of cases which relapsed after neocryl treatment.

The cases are classified into groups viz —

Group A—First stage cases with weekly injections. Of 6 cases treated 5 were apparently cured one case relapsed.

Group B—First stage with two injections weekly. Of 3 cases one was cured and 2 showed definite signs and symptoms of relapse.

Group C—Second stage with weekly injections. Of 10 cases only 3 can be considered as cured, the other 7 showing definite signs and symptoms of relapse.

Group D—Second stage cases, with injections twice weekly. Both of the cases treated in this group relapsed.

Group E which included cases previously treated with trypanosyl before neocryl was used has been disregarded. All the cases in this group have died.

It thus appears that of the 9 first stage cases treated with neocryl, 6 were cured and 3 relapsed, whilst of the 12 second stage cases, 9 were cured and 3 relapsed. These results are compared with those obtained during the same period by treatment with similar doses of trypanosyl. Of 77 first stage cases treated with this drug 69 were cured and of 67 second stage cases, 49 were cured. Acres considers that these figures show that the results obtained with neocryl in first stage cases on the whole compare favourably with those obtained with trypanosyl, but in second stage cases neocryl treatment compares very unfavourably with that with trypanosyl. W J.

HAWKING (Frank) Trypanocidal Activity and Arsenic Content of Human Blood after Administration of Tryparsamide.—*Trans. Roy Soc. Trop. Med. & Hyg.* 1941 Jan. 31 Vol. 34 No. 4 pp. 305-310 With 1 graph

This paper describes the trypanocidal activity produced in human plasma by the intravenous injection of tryparsamide. The methods used were similar to those employed by MURGATROYD RUSSELL and YORKE [this *Bulletin* 1935 Vol. 32, p. 26] in their experiments on rabbits.

The following summary is given —

"1 Persons were given an intravenous injection of tryparsamide and measurements were then made of the power of the plasma to kill trypanosomes of a serum-resistant strain of *T. gambiense*.

"2 Immediately after the injection, trypanocidal activity was absent it rose to a maximum at 24 hours, at which time the minimum trypanocidal concentration (24 hours exposure *in vitro* at 37°C.) varied between 1.2 and 1.8, corresponding to about 0.03% per ml. of trivalent arsenic. The activity then gradually diminished and 4 days after the injection it was inappreciable.

"3 Judging by a limited number of chemical estimations of the total arsenic content, tryparsamide disappears from the blood very rapidly after injection. In two persons the arsenic content of the plasma, 24 hours after injection, was only 0.07% As. per ml.

"4 The trypanocidal activity produced by tryparsamide in the blood was somewhat greater than that previously observed to occur in the cerebrospinal fluid, but its time relations were approximately similar.

"5 Preliminary experiments indicated that nearsphenamine produces a much greater activity in the blood than tryparsamide does, the minimum trypanocidal concentration of the plasma one hour after injection being about 1.1000 (corresponding to 7 to 10% per ml. of trivalent arsenic) after 24 hours this activity diminishes, so that it corresponds to 0.6% As. per ml. These results confirm those obtained by MURGATROYD RUSSELL and YORKE, working with rabbits."

W J.

HAWKING (Frank) Trypanocidal Activity and Arsenic Content of the Cerebrospinal Fluid of Sleeping-Sickness Patients, after the Administration of Tryparsamide.—*Trans. Roy Soc. Trop. Med. & Hyg.* 1940 Nov. 30 Vol. 34 No. 3 pp. 269-280 With 3 graphs. [10 refs.]

In previous papers (1937 and 1938) the trypanocidal activity and arsenic content of the cerebrospinal fluid of patients (mostly suffering

from general paralysis) in a mental home were examined after the administration of trypanamide. In these cases the meningeal lesions as shown by the cells and protein in the cerebrospinal fluid, were slight or absent.

In the present work these investigations were repeated on cases of human trypanosomiasis showing definite abnormality of the cerebrospinal fluid. The following are the conclusions —

1 In previous papers a method was described for the investigation of the trypanocidal activity *in vitro* and of the total arsenic content of human cerebrospinal fluid, after the administration of trypanamide. These observations were made on patients in a British mental hospital with approximately normal cerebral membranes.

2. In the present work, similar observations were made on patients suffering from *rhodesiense* sleeping-sickness involving the cerebral membranes.

3 The average degree of trypanocidal activity observed in the cerebrospinal fluid after the intravenous injection of trypanamide (3 grammes per 70 kg) corresponded to 0.014γ per ml. at 17 hours 0.01γ per ml. at 42 hours 0.022γ per ml. at 65 hours, and 0.006γ per ml. at 96 hours. It was inappreciable after 144 hours. The average total arsenic content of the fluid was 0.41γ per ml. after 17 hours 0.12γ per ml. after 42 hours, and only slight traces after 65 and 96 hours.

4 These quantities are approximately similar to those observed in the series studied in Great Britain, so that conclusions as to the relative merits of different arsenical compounds, reached by this technique in Great Britain are applicable also when the same compounds are used for the treatment of sleeping sickness in Africa.

5 Apparently the occurrence of trypanosomal lesions of the cerebral membranes as indicated by the increase of cells and protein in the cerebrospinal fluid has no constant influence upon the penetration of trypanamide into the fluid or on its activation therein.

6 The degree of trypanocidal activity produced by trypanamide in the fluid of these patients is insufficient to exert much effect upon freshly isolated strains of *T. rhodesiense*.

7 When patients were treated with neocryl or with undecane diamidine only insignificant degrees of trypanocidal activity were produced in the cerebrospinal fluid.

W Y

FRANKS (Andrew G.) & FISHER (Samuel) Sensitization to Arsenical Compounds. Sensitization to a Pentavalent Arsenical following Use of a Trivalent Arsenical.—*Arch. Dermat. & Syph.* 1940 Nov. Vol. 42. No 5 pp 808-810

The authors state that in a review of the literature on sensitivity to arsenical drugs they found only three cases of sensitivity to both trivalent and pentavalent arsenicals (EPSTEIN 1937 and GOLZ 1939). In all the three cases an exfoliative dermatitis developed on the administration of neoarsphenamine and the eruption recurred after injections of trypanamide.

Details are given of two further cases of arsenical dermatitis following neoarsphenamine therapy. Recurrence of the dermatitis took place on the institution of trypanamide therapy.

W Y

CULBERTSON (James T.) Natural Transmission of Immunity against *Trypanosoma lewisi* from Vaccinated Mother Rats to their Young.—*Jl. Parasitology* 1941 Feb Vol. 27 No 1 pp 75-79

Previous work [this *Bulletin* 1839 Vol. 36 p. 751] has shown that mother rats and mice after recovery from trypanosome infections, transmit specific protective substances to their young. These substances are presumably identical with the antibody of the serum and they are passed to the young largely or entirely through the milk of the mother and only in small amount, if at all, through the placenta.

In the present work the author has investigated whether mother animals immunized not by infection but by vaccination with a formalized suspension of trypanosomes likewise transmit protective substances to the young in an amount sufficient to protect the young from the specific infection. The parasite employed was *Trypanosoma lewisi* and the vaccine was prepared as follows: rats 15 days old when infected with *T. lewisi* were bled from the carotid when their infections were near the peak. The citrated blood was slowly centrifuged in order to separate the trypanosomes, which were then suspended in 0.5 per cent formalized physiological sodium chloride solution, and their number determined by counting with a haemocytometer. For injection, a suspension containing 4.3 million organisms per cubic centimetre of fluid was employed.

Results of the experiments, which are given in detail show that mother rats immunized against *T. lewisi* by vaccination in this way transmit their immunity to their young. The young become immune largely by ingesting the milk of the immune mother. Such immunity as the young may acquire through the placental circulation is largely lost within a few days after birth.

W. J.

HOAKE (Cecil A.) Recent Studies on the Kinetoplast in Relation to Heritable Variation in Trypanosomes.—Reprinted from *Jl. Roy. Microscopical Soc.* 1940 Vol. 60 pp 28-35 With 3 figs. [32 refs.]

Although the kinetoplast is typically a permanent structure in trypanosomes it may be absent in some or all individuals of certain strains or races under certain conditions. As in trypanosomes devoid of kinetoplasts all the vital functions remain unimpaired, it is clear that this structure—whatever its physiological rôle may be—is not indispensable for the existence of the flagellates.

The production of strains devoid of the kinetoplast presents an interesting problem in the genetics of trypanosomes and consequently the various ways in which this may happen are considered —

1. *Individual variation*—In strains of different species of trypanosomes a certain proportion of individuals lack the kinetoplast e.g., in typical strains of *T. cruzi* akinetoplastic trypanosomes may vary from 0 to 8 per cent this proportion fluctuating further within the same population at different periods of the infection.

2. *Induced disappearance*—Totally akinetoplastic strains may be produced by treating with certain dyes. Such strains remain akinetoplastic indefinitely. The action of the dyestuff appears to be twofold: it may destroy the kinetoplast directly or cause it to disappear or it may deprive it of the power to divide with the result

that when the trypanosome divides it gives rise to one daughter individual with a kinetoplast and to one without this structure

3 *Spontaneous disappearance*—*T. equinum* is in nature the only strain of trypanosomes totally devoid of a kinetoplast and it is thought that it might have originated from *T. evansi* through the loss of this structure. Recent observations have thrown further light on this problem. A normal strain of *T. evansi* maintained in the laboratory for 5 years suddenly became akinetoplastic (WENYON 1928 etc.) and Hoare and BENNETT (1937 and 1939) who examined the blood of more than 100 camels from the Anglo-Egyptian Sudan infected with *T. evansi* found that 5 of the strains were akinetoplastic. One of the latter was transferred to laboratory animals and for 3 years the aberrant condition has remained unchanged.

4 *Fluctuating variation*—Another strain of *T. evansi* isolated from a camel at first exhibited 1 per cent. of akinetoplastic forms but in subsequent passages through rodents the percentage underwent great fluctuations between a maximum of 71 and a minimum of 1.

The next portion of the paper is devoted to an analysis of the data from the point of view of genetics. It must be read in the original by those interested.

The following are the conclusions —

It has been shown that the akinetoplastic condition in trypanosomes can be interpreted either as *mutation* depending upon changes in the chromosome constitution, or as *cytoplasmic inheritance* independent of the nucleus. However since many cases of plastid modification in plants are known where the change is controlled directly or indirectly (maternal effect) by genes it is possible that both types of inheritance actually belong to the same category and are determined by factors in the nucleus (cf. Dobzhansky 1937 Sinott and Dunn 1939).

It is clear that the question regarding the genetic mechanism concerned with the origin and perpetuation of the akinetoplastic condition in trypanosomes stands in need of further investigation and it is with the object of drawing attention to this interesting problem that the present review has been written.

W. Y.

MAZZA (Salvador) Investigaciones sobre enfermedad de Chagas
IX. Otros mamíferos infectados naturalmente por *Schizotrypanum cruzi* o *cruzi* similares en provincias de Jujuy y Salta. [Mammals found Naturally Infected by *T. cruzi* in Jujuy and Salta.]—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 45 1940 pp 119-134 With 19 figs.*

By examination of the blood in thick drop and by xenodiagnostic methods Professor Mazza has now shown that the following animals are naturally infected by *T. cruzi* in the provinces studied —

In Jujuy Mustelidae *Tayra barbara* Canidae *Pseudalopex culpaeus andinus* Sciuridae *Leptosciurus argentinus* Chiroptera *Histiotus laephotis* (bat)

In Salta Canidae *Pseudalopex gracilis gracilis* Chiroptera *Myotis dinelli* *M. nigricans* Edentata *Chaetophractus vellerosus* *Pannosus* *Tolypeutes malacos* *Histiotus montanus* Marsupiales *Didelphys paraguayensis* H H S

MAZZA (Salvador) & FREIRE (Ramon S) Investigaciones sobre enfermedad de Chagas. Manifestaciones cutáneas (Chagomas) I Manifestaciones cutáneas de inoculación metastáticas y hematógenas en enfermedad de Chagas. Chagomas de inoculación chagomas metastáticos y chagomas hematógenos [Manifestations of Chagas's Disease, Cutaneous from Inoculation, and Metastatic Haematogenous].—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 46 1940 pp 3-38 With 45 figs

II. — & — Investigaciones sobre enfermedad de Chagas. Manifestaciones cutáneas (Chagomas) II Lipochagomas genitales por contagium y metastáticos Lipochagomas genitales hematógenos Su importancia diagnóstica en formas agudas de enfermedad de Chagas sin otras manifestaciones aparentes en lactantes.—*Ibid* pp 39-57 With 8 figs.

1 Two instances of local inoculation Chagoma, with secondary metastatic haematogenous tumours, are described in children aged 14 months and two years respectively with photographs of the patients and photomicrographs of the histological changes found in tissue taken by biopsy. The children had complained of pain in certain regions and the parents had detected local swellings and consequently sought medical advice. The photographs are beautifully reproduced

II. A similar case calling for no detailed abstract

H H S

MAZZA (Salvador) & URCELAY (Gilberto) Investigaciones sobre enfermedad de Chagas Manifestaciones cutáneas (Chagomas) III Caso de enfermedad de Chagas con chagoma de inoculación segundo a los 15 días de esbozo de complejo oftalmo-ganglionar y esquizotripanide morbiliforme [Chagas's Disease with inoculation Chagoma followed by Morbilliform Exanthem].—Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 46 1940 pp 53-84 With 39 figs

A very fully described case in a boy of 18 months. The article is embellished with a large number of photomicrographs showing the tissue changes. The inoculation chagoma was present on the anterior surface of the left thigh and sections from tissue taken by biopsy on the 15th day of disease showed numerous leishmanial fort in the skin and the cytological steatonecrosis. The day of disease was counted from the onset of oedema of the eyelid (Romaña's sign) and conjunctival injection. Treatment with 7002 Bayer was speedily followed by disappearance of the ocular symptoms and fading of the morbilliform eruption.

The authors thus enumerate the cutaneous lesions of Chagas's disease —

(1) Invasion of the skin itself (2) extension to the subcutaneous cellular tissue (3) Intense involvement of the epithelium with destruction and necrobiosis (4) inflammatory cyto-steatonecrosis, with leishmanial forms of *T. cruzi* present in the fat cells (5) central lymphangitis and nodular formations along the paths of the vessels (6) subepithelial infiltration with obliteration (borrimento) of the line of distinction of the epidermis and corium.

H H S

MAZZA (Salvador) & MIYARA (Salomon) Investigaciones sobre enfermedad de Chagas. Manifestaciones cutáneas (Chagomas) IV Enfermedad de Chagas aguda con chagoma de inoculación y esquizotripanide polimorfia comprobado por histopatología de biopsia de la lesión cutánea. [An Acute Case of Chagas's Disease with Chagomata.]—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 46 1940 pp 85-104 With 27 figs*

This is another case of what has been described above but calls for particular attention because it is probably the first time that diagnosis has been based upon biopsy of the inoculation chagoma. The patient was a man of 41 years who complained that about midnight on a certain occasion he felt a sudden pain in his left arm and noticed a red painful spot but no sign of a bite or puncture. The following morning he found near his bed a bug which had fed on blood. Five days later the left upper arm showed a rash of small spots (papules) followed by a circinate eruption of the chest and upper part of the abdomen reddish in colour disappearing on pressure. The eruption persisted for twelve days. Three weeks after his midnight experience he had oedema of the left eyelids which lasted for one day and a certain amount of pain in that eye continuing for ten days although examination of the eye revealed no cause. Examination of his blood by thick drop and by xenodiagnostic methods proved negative as did smears of tissue taken from the arm lesion. Stained sections however revealed leishmanial forms of *T cruzi* and the histological changes recorded in the foregoing abstracts. H H S

MAZZA (Salvador) BASSO (Germinal) BASSO (Redento) & CONTE (Donato) Investigaciones sobre enfermedad de Chagas. Manifestaciones cutáneas (Chagomas) V Caso agudo de enfermedad de Chagas con chagoma de inoculación antibrachial, chagomas múltiples metastáticos y hematógenos y complejo oftalmoganglionar izquierdo [An Acute Case of Chagas's Disease with Inoculation and Metastatic Chagomata.]—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 46 1940 pp 105-118 With 11 figs*

One more case this time in a child of two years recorded because of the wide distribution of secondary chagomata. The child's mother had noticed when it was first taken ill that there was a swelling of the eyelids of the left eye and a hard, dark coloured prominent area the size of a chestnut on the postero-internal aspect of the left forearm. Three weeks later several cutaneous swellings were observed by the mother one over the left breast two on the left flank. The child was brought to hospital and a thick drop of the blood revealed *T cruzi* in fair numbers (five in a preparation). Two or three days later other swellings were seen in the suprahyoid region, midline the size of an olive hard and adherent to the skin the left pectoral region, 8 cm in diameter raised red violet hard, cartilaginous adherent to the skin but moving over the deeper structures the right pectoral region 3×2.5 cm without discoloration and found by palpation in the thoracic wall at the right axilla hot and discoloured others in the left axilla without modification of the overlying skin in the left flank two one as large as an orange the other somewhat smaller

extending back to the lumbar region, the skin over them being hard and discoloured. All these are well shown in photographs. Improvement followed rapidly on the administration of 7602 Bayer though in smaller doses than those recommended by Mazza, 80-120 mgm. per kilo bodyweight
H H S

MAZZA (Salvador) BASSO (Germinal) & BASSO (Redento) Investigaciones sobre enfermedad de Chagua. Comprobación, en adulto de citosteatonecrosis subcutánea chagásica por siembra hematogénea (*Chagomas hematogénos*) de *S cruzi* [A Case of Haematogenous Chagoma in an Adult].—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 48* 1940 30 pp. With 25 figs [10 refs]

Chagoma is the name given to a tumour formation resulting from cutaneous inoculation of *T cruzi* and it may be followed by metastatic swellings spread by the blood stream. Its characteristic pathological lesion is a fat necrosis of the tissue cells especially the subcutaneous fat. This fatty necrosis is not a secondary degenerative change but part of the initial inflammatory stage of invasion, and is a manifestation of the colonization of the leishmania forms in the fatty tissue. Six cases are briefly referred to in children ranging in age from three to twenty-one months (in one the age is not stated). They showed the primary inoculation chagoma with secondaries 2-3 months later. Two of the six died these had not received treatment by 7602 (Ac) Bayer the others received it and recovered.

The author records in much detail an analogous case in a man of 50 years who presented himself with 19 of these tumours, 18 of them discovered by palpation, another in the right axilla harder firmer and more defined. At first the Machado reaction and inoculation experiments on puppae were negative but later positive. A biopsy was made of the axillary swelling and the pathological histology is described in minute detail and depicted in an excellent series of photographs showing invasion of the dermis and the presence of the leishmanial stage of *T cruzi* in the histiocytes of the tissue. The patient was given 5 cc. of 7602, intramuscularly [see this *Bulletin* 1940 Vol 37 p 146] this was repeated two days later and the swellings were much improved. Four days later he was given by injection 20 cc. of a 3 per cent solution freshly prepared. The tumours then rapidly disappeared. In all he had 22.2 mgm. per kilogramme.
H H S

MAZZA (Salvador) & JÖRG (Miguel E.) Investigaciones sobre enfermedad de Chagas. Reproducción experimental de nódulos de histiocitos del granuloma chagásico mediante el fenómeno Schwartzman. (Existencia de principio activo de *Schizotrypanum cruzi* capaz de provocar hiperplasia histiocitaria y su confluencia plasmodial.) [Histiocyte Nodules produced experimentally *T cruzi* and the Schwartzman Phenomenon].—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 47* 1940 18 pp. With 11 figs

From the intestinal contents of *Trypanosoma infestans* a strain of *T cruzi* was obtained and cultivated. The contents of four tubes were emulsified in 40 cc. of sterile NaCl solution, 0.85 per cent. in a 100 cc

flask containing 20 gm. of powdered glass. This was shaken for 6 hours to disintegrate the bodies of the trypanosomes. The resulting emulsion was filtered through cotton, then paper and finally through a Berkefeld V. With the product the authors produced in a dog nodules of reticular histiocytes indistinguishable from the lesions of Chagas's disease in man and animals. Considering the mode of preparation of the substance we may say that the nodules are due to a water-soluble substance not dialysable—that there is in *T. cruzi* a specific substance which evidenced by the Schwartzman phenomenon can provoke reticular histiocytosis. It may be inferred that it is the destruction of the protozoon in inflammatory foci or in macrophages that give rise to the formation of these nodules in infected man or animals. The Schwartzman phenomenon is exhibited by primary local sensitization giving rise to the characteristic phase of the phenomenon by injection of the same substance into the blood stream. One sees its parallel in natural infection—a primary local lesion, and a subsequent haematogenous dissemination with local excitation of foci already sensitized by parasitic action.

H H S

MAZZA (Salvador) & others. Investigaciones sobre enfermedad de Chagas. I-VI [Investigations on Chagas's Disease.]—*Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina (Jujuy). Publicación No 45* 1940 152 pp. With numerous illustrations.

This volume contains eleven papers by Mazza and his colleagues on Chagas's disease in the Argentine. The papers are concerned with clinical findings, studies on the vectors and on mammalian hosts of *T. cruzi*.

C IV

PLAGUE

PRÉCIS OF ABSTRACTS IN THIS SECTION

MOLL and O'LEARY (p 321) write of the history and epidemiology of plague in the Americas. This work cannot be further summarized but it is noted that in Bolivia the last of the American countries to be invaded by the disease man himself is believed to have played the principal part in transmission. This is ascribed to the practice of holding wakes over the dead with a final partition among the visitors of the blankets and clothing belonging to the deceased. BARRETO (p 322) reports on plague in Brazil. It has occurred in many cities and there is a focus in the north-east. It is endemic in São Paulo and Pernambuco the disease is largely rural in distribution. It increases in the harvest season and is affected by temperature and humidity. *Mus rattus* predominates in rural areas and *Xenopsylla cheopis* is the most prevalent flea in rural areas and in ports. A campaign against rodents and fleas has been initiated in the north-east and vaccination has been used on a considerable scale. The best results were obtained with a vaccine prepared at room temperature.

JUNTOR (p 323) refers to cultural differences between the motile *P. pestis* and the non-motile *P. pseudotuberculosis rodentium* [see

BRATNAGAR below. In reporting on plague in São Paulo he remarks that a 2 per cent. rat plague infection presaged a local human epidemic. A flea index of only 3 per rat is scarcely compatible with the occurrence of human plague. Glands from suspected rats are sent from the interior in Broquet's solution, of which the composition is given. In Mendoza DE LA BARRERA (p. 324) finds that sylvatic rodents have little contact with domestic rats, and that this accounts for the comparative absence of human plague in the presence of widespread epizootic. Sylvatic plague remains latent and although human cases are rare, its presence is undoubtedly to be regarded as a danger under conditions of great increase of the sylvatic fauna, as may happen with an abundant harvest of maize the access of plague to man will be rendered easier.

In the western part of the United States, ESKEY and HAAS (p. 324) show that plague is widely spread in wild rodents but that this has not been accompanied by infection of domestic rats. Some 50 species of fleas infest wild rodents and may show a certain degree of specificity for their hosts though this is not complete. Most infected fleas harbour the bacilli throughout their lives and the life span, after a flea has transmitted plague for the first time, averages three days, with occasional survivals up to 11 days. There is however an incubation period in the flea before transmission is possible and this may vary from 5 to 130 days. Plague does not damage the flea until blockage occurs when the flea dies of starvation. Since chloroform and ether are apt to destroy *P. pestis* they should not be used in the collection of fleas from rodents. Cyanide gas is better for this purpose. At refrigeration temperature *P. pestis* harboured by fleas may retain its virulence for 6 months or more. For transporting fleas to be used for inoculation a 2 per cent. salt solution is recommended. This inhibits the growth of other bacteria. In detecting plague in wild rodents the importance of inoculating their fleas into test animals is emphasized. BYINGTON (p. 328) reports that epizootic outbreaks are occurring in rodents in the Western United States and that these are part of a widespread enzootic. No human cases are known to have been associated with the disease in rodents.

GIBBONS and HITCHCOCK (p. 326) report on plague surveys in Western Canada, which refer to rats, rat fleas and sylvatic plague rodents. It is not known how infection in wild rodents was introduced into Alberta but the potential hazards make it a matter of concern. It has not yet been found in British Columbia.

BRATNAGAR (p. 327) describes the envelope of the plague bacillus, which he distinguishes from a capsular structure such as is present in the pneumococcus. Strains of *P. pestis* may be virulent or avirulent and the latter may be protective or non-protective for purposes of immunization. Virulent strains possess envelope substance in fairly large quantity. Protective avirulent strains have less, and non-protective avirulent strains have no envelope substance but may acquire it if grown on horse serum agar. The largest amount of envelope substance is developed during growth at 37°C. He (p. 328) discusses the difficulty in distinguishing between *P. pestis* and *P. pseudotuberculosis rodentium* see Junior above. He has found that certain strains of *P. pestis* possess envelope substance and that this interferes with the somatic type of agglutination. *P. pseudotuberculosis*, however, possesses no envelope substance but has a common somatic antigen with *P. pestis*. Suspensions made by mixing the two

organisms were used for agglutination tests of envelope and somatic antigens and for immunization of animals. The author remarks that to obtain reliable results in the serology of plague and of pseudotuberculosis living organisms should be used, but if killed suspensions are preferred plague bacilli killed by chemicals and pseudotuberculosis organisms killed by heat should be employed.

BURTON and HENNESSEY (p 329) report a case of meningitis due to plague.

BONTEBAKKER (p 329) considers that the serum treatment of plague is useful and that it should be given at an early stage. He gives the serum intravenously and, at the same time in and around the bubo.

OTTEN (p 330) sums up his experience with live vaccine. From early experimental work he came to the conclusion that it was impossible to obtain satisfactory immunity with a dead vaccine in the house rat and the guinea pig. In working on the problem of live vaccines he isolated the Tjiwidej avirulent strain which could not be made virulent but which had high immunizing power. When this strain was used to immunize man in doses of one-fifth of an agar culture the mortality over a large series of cases was only 20 per cent. of that in unvaccinated populations. In one area the deaths from plague were rapidly reduced to zero when this live vaccine was used on a large scale. The vaccine should be used as quickly as possible after preparation and modern dosage is 1/50th of an agar culture. C II

MOLL (Aristides A.) & O'LEARY (Shirley Baughman) *Plague in the Americas: an Historical and Quasi Epidemiological Survey*—*Bol Oficina Sanitaria Panamericana* 1940 May June Aug & Sept. Vol. 19 Nos. 5 6 8 & 9 pp 451-461 576-584 759-771 878-887 With 1 map [Refs in footnotes]

I. Many publications of the progress of plague in the Americas north and south have appeared in recent years. Some of these have dealt with separate States and some with the Republics of America. The present article deals particularly with Paraguay, Argentina, Brazil, Uruguay, Venezuela, Bolivia, Peru, Chile, Ecuador, The United States, Mexico, Panama, and The West Indies. These are valuable for reference purposes but perhaps the most interesting observations relate to the exceptional and negative instances regarding plague infection. Thus the last country in which plague has been recognized is Bolivia. Many States such as Colombia, the Guianas, Central America, the Dominican Republic and Haiti together with some smaller islands have not yet been invaded and the explanation of this immunity is still unsatisfactory. In other States it has proved easy to eradicate plague: these are Cuba, Mexico, Porto Rico, Panama and Uruguay and again the reason is still to seek. It was to be expected that sylvatic plague would receive special mention. This type of plague has come to be established in the country districts where no rats are present and has served to keep infection going as a potentially grave danger after the difficult task of clearing the ports has been accomplished. A great contribution to the diagnosis of plague was made by America with the introduction of mass inoculation and the inoculation of pooled fleas as a first resort in determining the actual existence of rodent plague. Much valuable literature on plague has been contributed for many years by Latin American countries some of it not as well known by English readers as it deserves to be.

Other subjects treated in this article relate to pneumonic and other types of plague vaccines and sera, variations with season and altitude rats and other carrier animals fleas and lice. Pneumonic plague made an early appearance in the original outbreak in Asuncion in April 1899 and has a very high mortality. Although vaccination is more or less a routine measure especially for plague personnel, there seems to have been no definite conclusion drawn as to its efficacy.

It is interesting to learn that Of the American countries invaded by plague Mexico the West Indies Chile Paraguay and Uruguay are now apparently free. All seaports are also free and the international danger is to-day considered comparatively slight if due precautions are taken. A chronological outline of plague in the Americas from 1898 to 1939 concludes the article the last sentence of which is 1939 December 1 case human plague reported in United States (Utah) first human case since 1937.

II *Argentina*.—Plague broke out in Argentina five months after the first cases in Asuncion. At first it was unrecognized and then discredited owing to the vigorous opposition to the diagnosis by authorities the press and the public. In time this was remedied and antiplague measures are now highly efficient.

Investigations have been made into the rat and flea plague vector question. It is interesting to note that while *X. cheopis* is the dominant plague flea foreign fleas have entered Argentina and the proportion of *X. cheopis* has fallen from 95 per cent to 65 per cent. Rural plague was associated as far back as 1905 with the wild guinea-pigs of Argentina, the *cusis*. This was abundantly confirmed and it has been found that areas formerly abounding in *cusis* or *Groenys* have become entirely depopulated after an epizootic of plague. And yet human infection is rare in spite of widespread epizootics.

Plague control measures have gone through all the usual phases from the date of entry of plague into any country. At the present time the procedure is essentially an anti-rat campaign, deratization in all its forms—rat killing, rat poisoning, rat trapping, rat proofing and so on.

III. *Bolivia*.—Bolivia has the distinction of being the last of the American countries to be invaded by plague this immunity being due to its isolated land-locked situation. Some special features have characterized plague in Bolivia in particular. Man himself is believed to have played the principal part in the transmission. This is ascribed to the practice of holding wakes over the dead with a final partition among the visitors of the blankets and clothing belonging to the deceased.

Plague control has proved very difficult, partly because of the poor living conditions and poor education of the people and partly because of the wooded, broken nature of the country. Plans for a permanent plague control campaign were drawn up in 1939. Sylvatic plague constitutes a major problem here as elsewhere throughout America.

IV F Harvey

BARRETO (João de Barros). O estado atual do problema da peste no Brasil. [Plague in Brazil].—*Bol. Oficina Sanitaria Panamericana* 1940 Sept. Vol 19 No 9 pp 866-877. English summary.

The ex Director of the National Department of Health of Brazil analyses the plague situation in that country. In the southern ports and cities the last cases of plague reported were Belém 1912.

Fortaleza, 1936 Recife 1924 Maceió 1925 Salvador 1928 Rio de Janeiro 1928 Santos 1931 Paranaguá 1926 and Porto Alegre 1933 A rather extensive focus in north-east Brazil (States of Piauí, Ceará, Paraíba Pernambuco Alagoas and Bahia) is described at length and another one less well known in S Paulo In that city the disease is endemic with human cases every year a total of 66 having been reported from 1930 to 1939 In the north-eastern focus 1,542 cases were observed from 1934 to 1939 The bubonic form has predominated in this area With the exception of three cases observed in 1939 in certain towns in the State of Pernambuco all the other cases of that year (75) and the 85 cases of the year 1938 occurred in rural districts Plague increases in the harvest season May to June in Ceará August to November in Pernambuco It is also affected by temperature and hydrometric conditions since these influence the longevity and propagation of fleas and the fertility number and aggressiveness of rats *Mus rattus* predominates in the rural areas constituting 90 per cent of the rats caught in Ceará, 74 per cent in Triunfo (Pernambuco) 90 per cent in Princesa and 62 per cent in Campina Grande The most prevalent flea is *X cheopis* with *X brasiliensis* running second. *X cheopis* is also the most prevalent flea in ports 98 per cent in Salvador 85 per cent in Fortaleza 79 per cent in Maceió and 60 per cent in Recife After a detailed study and having trained the necessary personnel, the Federal Government in 1936 initiated an intensive anti plague campaign throughout the entire north-east area centering its attack on isolated foci The campaign followed the general lines of combatting rodents and their parasites in addition to the vaccination of susceptible individuals Some 5 000 persons were vaccinated in 1937 about 27 000 in 1938 and almost 5 000 in 1939 At first the vaccine of the Oswaldo Cruz Institute was used (2 cc of culture in glycerinated agar submitted to 65 C for an hour) but it was later found that better results were to be obtained from the vaccine of the Public Health Laboratory prepared in peptone-gelose at room temperature The success of the campaign is evidenced by the decrease in the number of cases from 208 in 1934 822 in 1935 and 314 in 1936 to 35 in 1937 85 in 1938 and 78 in 1939

JUNIOR (F Prado) O serviço de laboratório na profilaxia da peste em São Paulo [Plague Laboratory Service in São Paulo]—*Boletim da Oficina Sanitaria Panamericana* 1940 Oct Vol. 19 No 10 pp 971-979 With 2 figs on 1 plate

Within a few days of the start of the Butantan Institute as plague prophylactic laboratory for São Paulo a focus of rat plague was discovered Over 3 000 rats were killed and plague was stamped out It is necessary however to be careful after such a campaign not to assume complete riddance of rodent plague as the disease may remain latent for a considerable time A diminution of the rat population by 50 to 75 per cent. should ensure 12 to 18 months of freedom from plague The practice of the laboratory followed the usual lines of macroscopic and microscopic diagnosis and took special notice of the cultural differences between the non-motile *P pestis* and the motile *P pseudotuberculosis rodentium* The various rat and flea indices were found to be most helpful Thus a 2 per cent. rat plague infection presaged a local human epidemic A reduction of the usual proportion of 4 to

5 female rats to 1 male indicated that the poison baits were effective for it is the female that is specially active in search of food. When the usual *R. norvegicus* proportional capture of 85 per cent. to the 15 per cent. of *R. rattus* and *alexandrinus* became lowered to 50 per cent for *norvegicus* it meant that the *norvegicus* a ground rat was being eliminated and that the other species which are roof rats, were becoming relatively increased. With diminution of the rats the fleas diminish and the flea index is lowered. A flea index of only 3 per rat is scarcely compatible with the occurrence of human plague.

Lymph glands from suspected plague rats from the interior of the State were sent to the laboratory in Broquet's solution—neutral glycerine 20 cal. carbonate 2 distilled water 80. This operation should be conducted as rapidly and as aseptically as possible and there should be no delay in despatch. The material is used for injection of a guinea pig or rats. IV F H

DE LA BARRERA (J M) Estudios sobre peste silvática en Mendoza. [Sylvatic Plague in Mendoza.]—*Rev Inst Bacteriológ.* Buenos Aires 1940 Dec Vol 9 No 5 pp 565-586 With 7 figs. & 1 map

The 1837 epidemic of pneumonic plague in Mendoza, a province of the Argentine [this *Bulletin* 1940 Vol 37 p 423] induced the legislature to pass a measure for the study of (1) the mode of preservation of the organism of sylvatic plague in the interval between one epidemic and another and (2) the rôle played in infection by the domestic rat. An extensive survey was begun of rodents and their ectoparasites. In the course of this work a new rodent was discovered in the nitre regions. This has been named *Tympanoctomys barrerae* and is somewhat larger than a *Geomys*.

The relations of rural plague with that of the rat were specially studied and the same conclusion formed as had been arrived at before namely that sylvatic rodents had little contact with the domestic rat. This accounts for the comparative absence of human plague in the presence of widespread epizootic. It has arisen at places far removed from one another and where no possibility of importation could have taken place. It must have persisted as enzootic. Sylvatic plague is not merely a rodent infection it is also a flea infection. With the diminution of the flea index in summer and the diminution of rodents by death during an epizootic, propagation of the disease becomes increasingly difficult. The consequence of this is that plague remains latent by reason of the reduction of acute cases.

Although sylvatic plague has not been accompanied by much human plague its existence is undoubtedly to be regarded as a danger. Under conditions of great increase of the sylvatic fauna, as may happen with an abnormally abundant harvest of maize the access of plague to man will be rendered easier. The reason for this is that contacts, within human habitations of the plague-carrying *Rattus* and *Xenopsylla cheopis* with sylvatic infection are greatly facilitated thereby. IV F H

ESKEY (C R) & HAAS (V H) Plague in the Western Part of the United States.—*Public Health Bull* No 254 Washington. 1940 pp v+83 With 61 figs [Numerous refs]

This important work, some of which has already been abstracted [this *Bulletin* 1939 Vol 38 pp. 310-368] is divided into the three

parts Introduction of plague and its spread flea investigations and demonstration of plague infection by inoculation of parasites. Each of these parts has its summary which is full of detail. The photomicrographs of fleas found on rats and on the various animals subject to sylvatic plague are clear and useful. Some of the points dealt with are —

Plague spread gradually among wild rodents and attracted little or no attention till 1934 by which time it had spread over a vast region extending from the Pacific coast to the Rocky Mountains. The rodents affected and forming reservoirs of plague are divisible into the ground squirrels the wood rats and the prairie dogs. It seems probable that plague has not yet reached beyond the Rocky Mountains. Although this epizootic condition is widespread it does not seem to have given rise to or been accompanied by domestic rat infection and this accounts likewise for the comparative infrequency of human infection.

Some 50 species of fleas have been found to infest the wild rodents of the Western States and these may show a certain degree of specificity for their hosts but it is not quite complete. It is a mistake to judge of the degree of flea infestation solely from the insects which can be collected from the body of the captured animal for this would leave out of account those which are to be found in nests and runways. Nevertheless plague infected fleas are unlikely to survive for any length of time in abandoned nests. The fleas only become infected when the blood of the host contains a sufficiency of plague organisms. Thus experimentally only 32 per cent of exposed fleas were infected by the blood of guinea-pigs found to contain over 10 plague organisms in each microscopic field while not a single flea was infected when bouillon culture failed to show the presence of *P. pestis* in the blood of sick animals. It was found that most plague infected fleas harboured virulent organisms throughout their lives the life span after a flea had transmitted plague for the first time being on the average 3 days with occasional survivals of 7 to 11 days. Before the infected flea however could transmit plague a period of incubation called extrinsic incubation has to take place and this varied in experiments from 5 to 130 days. The period may be shortened by increases of temperature and by other factors and it is obvious that the shorter the extrinsic incubation the more rapidly the disease will be disseminated. The life of the flea does not seem to be affected by plague infection until blockage occurs when the flea dies of starvation.

When collecting fleas from rodents with a view to inoculating laboratory animals it is necessary to bear in mind that chloroform and ether are apt to destroy *P. pestis*. It is better therefore, to use cyanide gas for this purpose. It is also better to make flea inoculation tests as soon as possible after collection of the parasites during warm weather to avoid attenuation of the bacillus. At ordinary refrigeration temperatures *P. pestis* harboured by fleas may retain their virulence for 3 to 6 months or longer. Again, a method of transportation of fleas to be used for inoculation of guinea-pigs is in 2 per cent salt solution. This inhibits the growth of putrefactive and other bacteria. A final word is said on the importance of inoculation of the fleas of wild rodents as a method of detecting the existence of plague among them because this is a more reliable and sensitive test than the examination and inoculation of the tissues.

W F H

BYINGTON (L. B.) Two Epizootics of Plague Infection in Wild Rodents in the Western United States in 1938.—*Public Health Rep* 1940. Aug 16 Vol. 55. No. 33 pp 1498-1501 With 3 figs

A close watch is now being kept on undue mortality among wild rodents in the Western United States and the two epizootics here recorded are instances of how the advance of plague infection may be brought to the notice of the authorities. Lincoln County Wyoming, is sparsely inhabited and is a rough rocky inter-mountain plateau, having a population distribution of 2-5 persons per square mile, with concentrations at mining centres and along the railroad. Mortality here occurred among ground squirrels (*Citellus*) and wood-chucks (*Marmota*). Collections of rodents were made, represented by numbers from 1 to 150 and each collection, whether of one or more individuals was kept separate. The pooled ectoparasites from each collection were used for guinea-pig inoculation and gave 37 plague infections for 115 collections, or 32 per cent.

The epizootic in Catron County North Mexico was even more interesting, for the population has a distribution of only 0-4 persons per square mile and the area consists of high rugged mountains or desert mesa. Moreover this epizootic took place more than 150 miles from any other known plague infected region. In this case unusual mortality was noticed in prairie dogs (*Cynomys*) and proved to be due to plague.

The conclusions drawn are that—"Epizootic outbreaks of plague in rodents are occurring in the Western United States. These are part of a widespread enzootic of the disease in many species of rodents.

No human cases were known to have been associated with the infection in rodents

W F H

GIBBONS (R. J.) & HUMPHREYS (F. A.) Plague Surveys in Western Canada.—*Canadian Public Health J* 1941 Jan Vol. 32. No. 1 pp 24-28

These plague surveys refer to rats, rat fleas and similar surveys for sylvatic plague rodents. Each rat as it was captured was sealed into a paper bag which prevented escape of its ectoparasites. The fleas were collected from the animals into 0.9 per cent. salt solution. Autopsies of the rats were conducted and the fleas sorted into species for the determination of the "choyfs index." The fleas were still usable for inoculation tests.

Sylvatic plague investigations in the Western provinces of Alberta and British Columbia followed the lines of those conducted in Washington, Idaho and Montana, which are the bordering provinces of the United States. "Ground squirrels with their ectoparasites formed the bulk of specimens collected," in particular *Citellus columbianus columbianus* and *Citellus richardsoni richardsoni*.

One case of suspected human plague in a farmer is referred to. He was in the habit of feeding mink on ground squirrels and the mink which had been healthy before began to die.

At present it is not known how infection in the wild rodents was introduced into Alberta, but it is obvious that this infection is "matter of concern because of the potential hazards involved." Sylvatic plague has not yet been found in British Columbia

W F H

ROBERTS (Austin) *Mammals concerned in the Bubonic Plague and Rabies Problems in South Africa.*—*South African Jl Sci* 1935 Vol 32. pp 414-460

BHATNAGAR (S S) *Bacteriological Studies on Pasteurella pestis and Pasteurella pseudotuberculosis Part I The Morphology the Growth and the Dissociation of Pasteurella pestis*—*Indian Jl Med Res* 1940 July Vol. 28 No 1 pp 1-15 With 6 figs. on 1 plate [29 refs.]

The problem of antigenic potency is one of the highest importance for active prophylactic immunization and is bound up with such questions as the use of rough and smooth bacterial types dead and living organisms virulent and avirulent types temperatures of incubation and the cultivation of organisms in bouillon or on agar. Material has been collected by the author from as many sources as possible in order to test out some of these problems for the plague bacillus and he had at his disposal 92 strains. He does not consider that the plague bacillus possesses a capsule of the well defined type like the pneumococcus. It has a structure a most important structure from the point of view of immunization which manifests itself as a halo round the body of the organism and has been described as the envelope of the plague bacillus. Strains of the plague bacillus can be divided into virulent and avirulent while the avirulent are sub-divided into protective and non protective with reference to their usefulness in immunization. Two of these protective avirulent strains which have been used in living form for the inoculation of human beings are the well known Tjirwidej from Java and the E.V strain of Madagascar.

For the study of the envelope of the plague bacillus an Indian ink method was used with the addition of staining for one hour by a mixture of equal parts methyl alcohol and one per cent methylene blue. All virulent strains were found to possess envelope substance in fairly large quantity. Protective avirulent strains also showed envelope substance but not in the same quantity as the virulent while non protective avirulent strains had no envelope. It was found however that non protective avirulent strains if grown on horse serum agar acquired envelope substance and in the process developed the typical viscosity of a normal plague culture. In contrast to this phenomenon of elevation to normality the envelope strains whether fully virulent or protective avirulent could be made by serial subculture on rabbit blood agar every 48 hours and continuous incubation at 37°C to lose all trace of envelope substance. Temperature of incubation had a most important influence both on the envelope and the size of the body of the bacterium. It was consistently observed that the largest quantity of the envelope substance was produced at 37°C. and reduction of this temperature was found to be accompanied simultaneously with a decrease in the amount of the envelope substance as well as in the size of the bacterial cell. The conclusion has been reached that the most suitable medium for the optimal development of the plague bacillus both from the point of view of the envelope and the bacterial body is 10 per cent. horse serum agar and that addition of a carbohydrate results in the production of a large amount of envelope substance although the total growth is not so luxuriant.

H F H

BHATTAGAR (S. S.). Bacteriological Studies on *Pasteurella pestis* and *Pasteurella pseudotuberculosis*. Part II. The Serology of *Pasteurella pestis* and *Pasteurella pseudotuberculosis*.—*Indian J. Med. Res.* 1940. July Vol. 28. No. 1 pp 17-42. [22 refs.]

The organisms *Pasteurella pestis* and *P. pseudotuberculosis rodentium* are closely allied and have given rise to difficulty on occasion, in the diagnosis of plague in rats. One great difficulty in separating the two organisms has been that of applying serological tests—in particular the preparation of stable suspensions and high titre sera for agglutination tests has been a stumbling block. This handicap appears to have been overcome by the author without resort to diminution of salt content in the suspending fluid, and at the same time he makes a contribution to the knowledge of the antigenic constitution of the two organisms.

It has been shown by the author that certain strains of the plague bacillus possess envelope substance and certain strains, especially the "non-protective avirulent," do not. Now it has been found that envelope substance interferes completely with the somatic type of agglutination—nevertheless, "where this structure was absent, although somatic agglutination took place the results could not be interpreted correctly because of the salt and serum sensitivity" of suspensions even in such low concentration of salt as 0.1 per cent. Moreover it was found that even "non-envelope" plague strains when subjected to agglutination tests, showed a modicum of envelope substance which could not be detected morphologically. An accident revealed that *P. pseudotuberculosis* possessed no envelope substance at all—it also possessed a common soma antigen with *P. pestis*. It was this finding that enabled the author to prepare suspensions for testing somatic agglutination by admixture of these two organisms—these suspensions, which were made with normal salt solution and represented supernatant fluid of a suspension from a serum-agar culture after deposition of coarse clumps, were stable and were made up of single organisms. They were suitable for agglutination tests of envelope and somatic antigen and were also usable to immunize animals to give high titre sera. Comparative tests revealed that strains of *P. pseudotuberculosis* "belonging to group I types A and B gave the highest readings in agglutination tests against antiplague sera."

Human cases of plague in the state of recovery showed both envelope and somatic agglutinins, although of low titre. In the serological reactions, which involve the use of the two organisms plague and pseudotuberculosis, that between the plague bacillus and its homologous serum has been designated as envelope antigen-antibody reaction and that of *P. pseudotuberculosis* as somatic antigen-antibody reaction. The differences found between the two organisms, which may prove highly useful in the identification of the plague bacillus, its antigenic analysis and in the diagnosis of plague, are summed up in the antigenic composition of *P. pseudotuberculosis*. This organism may be made to develop a flagellar antigen, but it has no envelope antigen, only somatic antigen. The author's study has shown that "*P. pseudotuberculosis* may be stated to be possessed of somatic O antigens of the following order: (1) An antigen shared by all the strains of this organism as well as by *Pasteurella pestis*—the common group antigen (2) An antigen present only in certain strains of this organism—the

group specific antigen. (3) An antigen which characterizes individual strains—the type specific antigen. In conclusion the observations are made that to obtain reliable results in the serology of plague and of pseudotuberculosis the use of live organisms should be preferred. If however the employment of killed suspensions is desired, chemically treated plague bacilli and heat killed organisms of pseudotuberculosis should be employed.

IV F H

BURTON (E.) & HENNESSEY (R. S F) An Unusual Case of Plague with Meningitis.—*East African Med J* 1940 Oct. Vol. 17 No 7 pp 266-270

A child aged three with history of fever headache and cough of sudden onset six days previously was admitted to hospital with a temperature of 103°F and looking ill the spleen was palpable. A small superficial abscess over the anterior tibial muscles was opened but no organisms were found in the pus. Treatment was by M. and B 693 in six days the temperature was normal and the child looked well. Four days later there was a sudden rise of temperature. No malarial parasites were found and sulphapyridine treatment was given for 5 days when the temperature returned to normal. Once more pyrexia and headache reappeared and now the signs of cerebrospinal meningitis were definite. The lumbar puncture fluid was turbid and escaped under great pressure. Anti-meningococcal serum was given but the child died. Examination of the cerebrospinal fluid microscopically culturally and by guinea pig test showed that the organism isolated was *Pasteurella pestis*. It is suggested that the original subcutaneous abscess was a plague abscess and that this was a case of subacute or chronic plague terminating in a haematogenous meningeal infection.

IV F H

BONEBAKKER (A) Serumtherapie bij pest. [Serum Therapy in Plague].—*Geneesk Tijdschr v Nederl Indië* 1940 Oct. 22 Vol. 80 No 43 pp 2502-2511

Of 154 plague patients admitted to hospital 111 were treated with serum. The non treated were however not alternate cases. A considerable number of plague cases had also been treated in earlier years with bacteriophage. In his final judgment the author makes frank admission of inability to come to definite conclusions on the value of the treatment and says 1. A definite verdict on the success of the serum cannot out of the experience gained, be given either statistically or clinically. Further it was not possible to say whether serum was better than bacteriophage. 2. The impression was formed that the serum did benefit the patient and should therefore not be withheld. 3. It should be given early daily in fairly large doses and continued until the temperature falls and the general condition has improved. 4. No serious results occurred from serum treatment although serum sickness was frequent.

The method of administration is of some interest. To begin with, a dose of 10 cc. was given intravenously simultaneously with 10 cc. in and around the bubo. On the following days the same dose was given half intravenously and half intramuscularly for as many as five days.

Later however the dose was doubled sometimes all of it was administered intravenously and on one occasion for 12 successive days with total of 390 cc. serum

IV F H

OTTEM (L.) Het levende pestvaccin en zijn resultaten (1935-1939) [Results of Living Plague Vaccine.]-*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Dec. 10 Vol 80 No. 50 pp. 2878-2950 With 3 charts [16 refs.]

This article sets out the results of a long period of work on plague vaccines and is divided into three main sections—experimental investigations, plague vaccination, and preparation of the plague vaccine

I. *Experimental*—Early work on the dead plague vaccines sometimes gave satisfactory results and sometimes negative results, whether the vaccine was the Haffkine bouillon vaccine, the German agar vaccine or Flu's plague vaccine. This led up to the conclusion of the author that it was not the particular type of vaccine which was responsible for the variation but the particular species of animal used in the testing. The domestic rat is the least susceptible to plague infection and the guinea pig the most susceptible. It appeared also that the grade of susceptibility and the degree of immunity which could be reached were highly correlated so that the domestic rat mouse house rat and guinea pig form an ascending series as regards susceptibility and a descending series as regards possibility of immunization. The outcome of these researches convinced the author of the impossibility of attaining a satisfactory immunity with dead vaccine in the house rat and the guinea pig and led him to diverge to the trial of living vaccine. An accidental isolation of a strain of plague from a dead rat accelerated the research and culminated in the well-known advocacy of the use of living plague vaccine for human prophylactic inoculation. This was the famous strain "Tjirwedej" which had been preserved in deep stab serum agar culture at 5°C. for 4 months and was then found to be avirulent. Even in doses of 5 cc. of a bouillon culture, or a whole agar culture, it proved harmless to house rats and guinea pigs. Nor was this avirulent condition altered by passage through animals. What was still more important, however was the next finding that the Tjirwedej strain was not merely avirulent, but was highly and effectively immunizing even in the very susceptible test animals, the house rat and the guinea pig. This proved to be the case not only for artificial infection but for infections contracted under more natural conditions, such as by blocked flea transmission. The vaccinated animals showed a high degree of survival to the flea infection, in marked contrast to the non-vaccinated controls. Other points connected with the use of living vaccine were submitted to experimental investigation—rapidity with which immunization could be affected duration of the immunity the spontaneous loss of virulence by virulent strains isolation of avirulent variants the antigenic potency of avirulent strains reversal of potency according to test animal (Tjirwedej and Soemedan) for the house rat and guinea pig respectively the relative efficacy of a killed virulent bouillon vaccine and a living avirulent bouillon vaccine efficacy of avirulent bouillon or agar cultures grown at different temperatures conversion of a virulent to an avirulent plague with the help of bacteriophage. The results of all this experimental work are shown in 20 tables.

ii *Plague Vaccination*—The satisfactory result obtained in very susceptible animals like the rat and the guinea-pig with the living avirulent strain Tjiwidej suggested the next step—the immunization of man with this strain. The method of choice was the statistical one of alternate case vaccination. A preliminary trial on volunteers showed that a dose of one-fifth of an agar culture produced no serious local or general symptoms. The result of the large scale trial worked out at 37 435 persons vaccinated, with 1·01 per thousand mortality and 44 757 non vaccinated, with 4·75 per thousand mortality—a reduction to about 20 per cent. Deaths were confirmed as due to plague by means of lung and spleen puncture and laboratory examination. A clear-cut graph for the regency Bandoeng gives the plague deaths during the years 1932 to 1940. The numbers show markedly rapid reduction to zero from 1935 onwards and by the inclusion of calculated numbers for non vaccination the graph demonstrates what the amount of reduction in mortality is supposed to have been.

iii *Preparation of Plague Vaccine*—Freshly prepared living Tjiwidej vaccine even in a dose of a whole agar culture is practically without reaction in the rat. With keeping even in the cool room and much more rapidly at room temperature the bacilli die off endotoxin is set free and the toxicity rises. It is necessary therefore if reaction is to be avoided that the vaccine should, once it is issued be used as quickly as possible. The vaccine will preserve its activity in the cool room for at least a month. Extreme care has to be taken to ensure the sterility of the vaccine. In the earliest years one-tenth agar culture was the dose for an adult and one twenty fifth for children but this dose was altered to one of one-fiftieth for all ages in 1938.

What of the possibility of recovery of virulence? Experience with strains which have undergone spontaneous loss of virulence has shown in practice that this change is not reversible. W F H

MALARIA

PRÉCIS OF ABSTRACTS IN THIS SECTION

In letters to the *Lancet* HUTTON NAPIER and MANSON BARR (p 333) all refer to malaria in ships' companies after the ships have called at a West African port (Freetown is named by two of the writers). Infection is contracted even if the ship lies well away from the shore and is presumably due to mosquitoes blown aboard or brought in small craft coming alongside. In some cases the disease is not and cannot be diagnosed on board and it is important to remember the possibility and to give quinine or atabrin to every suspected case, since a number of deaths have occurred. Prophylactic atabrin (or the British equivalent mepacrine hydrochloride) is advised for ships calling at these ports, and the dosage suggested is 0·3 gm daily for 7 days.

McMURDO (p. 333) records a lower incidence of malaria in troops during manoeuvres in the Philippine Islands during 1940 than during 1938 and 1939 and ascribes this reduction to the protective measures taken. These included mosquito bars (? nets) prophylactic quinine and the use of Bamber oil as a repellent.

YOUNG *et al.* (p. 334) show that the peak of parasite segmentation in four patients infected with *P. malariae* changed when the patients reversed their sleep from night to day but was not affected by light when two of the patients slept in lighted and two in darkened rooms.

STRATMAN THOMAS (p. 334) writes of the effect of temperature on the development of *Plasmodium cruzi* in *Anopheles quadrimaculatus*. Details are given, and in general it was found that the parasite was more susceptible to unfavourably high than to unfavourably low temperatures and that the mosquito could survive higher and lower temperatures than could the developmental forms of the parasite.

THOMSON (p. 335) has made a careful detailed study of the behaviour of *Anopheles minimus* in Assam. Although shading is effective in eliminating breeding in running water shade in itself is attractive to the ovipositing female and to the larva shading is only effective if it is dense enough to prevent the growth of vegetation along the water margins and thus to increase the rate of flow. The gravid female prefers to oviposit in still water and the larva, contrary to common belief is ill adapted to resist water flow. Control, therefore can be achieved by freeing the stream edges of vegetation even in the light though which is the better method will depend on local circumstances. Indiscriminate shading may even lead to increase in oviposition. The absence of *A. minimus* from shallow stagnant rice fields is related to the fact that this water repeatedly attains a temperature of 41°C. which kills the larvae in 5 minutes, though the larvae of *A. kyaukseus*, *A. barbrostris* and *A. reges* resist even higher temperatures.

ZWEMER *et al.* (p. 336) show that in malaria there is an increase of potassium in the blood plasma which is marked just before the rise in temperature. The possible origins of this potassium are discussed and it is thought that potassium may be the toxic substance released from the red cells at the time of rupture.

STRATMAN THOMAS and DULANEY (p. 336) failed to obtain positive skin reactions or precipitin tests in cases of malaria, even though several antigens were used. They found that the complement fixation reaction, however yielded highly specific results with antigens from human or monkey blood containing parasites, and describe the preparation of this antigen.

SANFORD *et al.* (p. 337) report on cases of malarial coma admitted to a hospital in Tennessee during five years.

WILKINSON (p. 337) records three cases of mental derangement which followed the administration of atabrin. All made rapid recoveries.

SMITH and MEXON (p. 338) failed to produce immunity in monkeys inoculated with killed parasite substance prepared from *P. knowlesi* by the method of CHRISTOPHERS and FULTON. The method is described. They (p. 338) have infected monkeys and fowls by allowing blood heavily infected with relevant parasites to drop into their mouths.

MULLIGAN and RUSSELL (p. 338) show that sporozoites of *P. galli* *meurum* are clumped by normal animal sera, but more readily by sera of animals with malaria, and most of all by sera of fowls chronically infected by the homologous parasite.

HUTTON (E. L.) NAPIER (L. Everard) MANSON BAHR (Philip)
Malaria on Board Ship [Correspondence]—*Lancet* 1940
 Nov 9 & 30 pp 603 696

i. The first correspondent refers to a report that a ship's company suffered a high mortality rate from malaria after calling at a West African port in spite of the prophylactic issue of quinine. He recommends the substitution of atebryn for quinine the former unlike quinine is a true causal prophylactic. A drug identical with atebryn is now being manufactured in England.

ii. The second letter reports the occurrence of four cases of malaria on board a ship. Infection in some, if not in all of these cases was acquired at Freetown although the ship was anchored well over a mile from the shore. Infected mosquitoes may have been blown from the shore the most likely speculation or they may have been brought by an oil-lighter motor launches or country boats all of which came alongside.

iii. Reference is made to the large number of seamen and passengers arriving in London with severe infections of subtertian malaria the infection of which had been acquired in the harbour of Freetown. Given a favouring wind and other conditions malaria infection may be contracted in any location in Freetown harbour however far from the shore. In some cases the stay in Freetown harbour had been less than 12 hours. In some cases malaria had not been diagnosed on board ship and deaths occurred. Subtertian malaria should be suspected in every case of sudden illness arising ten days or more after leaving the west coast of Africa. Quinine or atebryn should be given to every suspicious case in the absence of microscopical diagnosis which usually is impossible on board ship. The author recommends a prophylactic course of atebryn 0.3 gm. a day for 7 days, during the voyage home. A product identical with atebryn, mepacrine hydrochloride is now being manufactured in England. *Norman White*

McMURDO (H. B.) **Malaria, 1940 Maneuvers, Luzon, Philippine Islands.**—*Milit Surgeon* 1940 Sept. Vol. 87 No 3 pp 252-255 [Summary taken from *Public Health Engineering Abstr* Washington 1940 Dec. Vol. 20 No 12. p 12 Signed H. A. JOHNSON]

The Malaria records for the 1940 army maneuvers were very low in comparison to the 1938 and 1939 rates. This doubtless resulted from the general knowledge relating to the breeding habits of *A. minimus* promulgated to all branches of the army. In view of this knowledge camp sites were more appropriately selected with reference to *A. minimus* habits. Mosquito bars were systematically employed, prophylactic quinine in 5 grain doses was routinely used, and Bamber oil was used as a repellent. In view of the observations made it was recommended for future maneuvers that the Medical Department play an active role in the selection of camp sites that mosquito bars be employed and inspected for tears etc. daily that mosquito bars be provided with an 18 in border of unbleached muslin that quinine be routinely employed in daily doses of 5 grains as a prophylactic measure and that Bamber oil be used externally as a repellent. It is of interest that the withdrawal of all quinine is recommended immediately upon return from maneuvers.

YOUNG (Martin D.) COATNEY (G. Robert) & STUBBS (Trawick H.)
 Studies on Induced Quartan Malaria in Negro Patients. II. The
 Effect of modifying the External Conditions.—*Amer J Hyg*
 1940. Nov Vol. 32. No. 3 Sect. C. pp. 63-70. With 4 figs

This is a continuation of a study on quartan malaria the first part of which dealt with the periodic phenomena of the asexual cycle [see this Bulletin 1940 Vol. 32 p. 783]. In the four patients studied segmentation of the parasites reached its height at 8-0 a.m. with remarkable constancy. After the infection and the periodic phenomena had become established the external conditions of these patients were reversed. Night was turned into day and vice versa. The patients slept all day two in a dark and two in a well-lighted room. They were up all night in a well-lighted room and had meals at 7-0 p.m. midnight and at 2-0 a.m. In the patients who were kept continuously in the light the peak time of segmentation changed from 8-0 a.m. to 8-0 p.m. When one of these patients returned to normal conditions the peak time again appeared at 8-0 a.m. In one of the other two patients a similar change was observed. In the other the cycle was shortened until the peak occurred 22 hours earlier than normally expected. Thus the reproductive activity of *P. malariae* in man is markedly affected by the conditions of the host. light whether continuous or intermittent has no effect. N W

STRATMAN THOMAS (Warren K.) The Influence of Temperature on
Plasmodium vivax.—*Amer J Trop Med* 1940 Sept. Vol. 20
 No 5 pp. 703-715

Control and experimental lots of insectary-reared *A. quadrimaculatus* were fed upon patients undergoing malaria therapy with a strain of *P. vivax*. The blood of the patients selected contained gametocytes and exflagellation was always demonstrated before anophelines were applied. The fed mosquitoes were placed in incubators at various temperatures where they were kept in transit from the hospital to the laboratory. The time occupied in transit was from one to one and a half hours. During this time the mosquitoes were kept at about 28°C. For the various temperatures there were two large incubator rooms kept at 37.5°C. and 28°C. a small electric incubator adjusted to temperatures of 28°, 30° and 32°C. an air-conditioned insectary kept at 22° later changed to 24°C. and a refrigerator with thermostat control for temperatures from 15° to 17°C. and below. The cycle of sporogony was completed within the temperature range of 15-17° to 30°C. The shortest time for the completion of the cycle was 8 days, at 28° and at 30°C, and the longest time 36 days, at 15-17°. At all stages of the cycle *P. vivax* was more susceptible to unfavourably high temperatures than to unfavourably low temperatures. Shortly after feeding, an infected *A. quadrimaculatus* was completely sterilized if its infection was necessary to secure this result. During the half days exposure was necessary after feeding, exposure of the mosquito to growth of oöcysts, 7 to 13 days after feeding, exposure of the parasite at 1 to 10°C. 24 days exposure was necessary to interrupt oöcyst development. When sporozoites were present in the salivary glands 24 hours exposure to 37.5°C. inhibited the infectivity of the sporozoites.

for human inoculation. Adult *A. quadrimaculatus* can survive higher and lower temperatures than can the developmental forms of *P. vivax* which it may harbour

N IV

THOMSON (R. C. Murrehead) Studies on the Behaviour of *Anopheles minimus* Part I. The Selection of the Breeding Place and the Influence of Light and Shade.—*Jl Malaria Inst of India* 1940 Sept. Vol. 3 Nos. 2 & 3 pp 285-294 With 3 figs 4 graphs & 9 plates. [23 refs.] Part II. The Influence of Water Movement on the Selection of the Breeding Place.—*Ibid* pp 295-322. With 9 figs. 2 graphs & 4 plates Part III. The Influence of Water Temperature on the Choice and Suitability of the Breeding Place.—*Ibid* pp 323-348 With 3 graphs, 1 fig & 3 plates [11 refs.]

The author of these papers is making a systematic study in the field and in the laboratory of the factors in the environment which limit the breeding of *Anopheles minimus* in Assam to certain well defined types of water. He deals here with the factors of light and shade water movement and temperature. He has already pressed the analysis of the behaviour of this mosquito further than has previously been achieved with any other Anopheline species.

It is characteristic of *A. minimus* that it nearly always breeds in running water with grassy edges and that it may be eliminated from these breeding places by shading them heavily with vegetation. But the author shows that shade in itself is highly attractive to the ovipositing female. She lays her eggs normally at night mostly in the first third of the night, but even at this low level of illumination the effects of shade are very important. She will not lay eggs in an unshaded position. Normally the necessary degree of shade is provided by grass etc. along the water margins but indiscriminate shading of the breeding places may well lead to an increase in oviposition.

Shading is effective as a method of control only if it is dense enough to produce certain secondary effects. The most important of these is the elimination of vegetation from the water margins with a consequent increase in the rate of flow. This acts in two ways (i) The gravid female prefers to oviposit in still water and will avoid water flowing even at a rate of 1 foot in 20 secs. Practically still water is to be found in the streams only in the grassy edges or in side pockets. (The female will oviposit in shaded side pockets of still water completely devoid of vegetation) Oviposition in densely shaded streams is thus prevented by the increased water movement that results from the exclusion of all grass and other plants. (ii) Contrary to the popular belief the larva of *A. minimus* is ill adapted to resist being carried away by flowing water. It lives normally in the still water at the edge of the stream. It cannot resist a rate of flow greater than 0.29 foot per sec. It is normally maintained in this still water not by an avoidance of moving water but by a very powerful attraction to shade. This reaction is intensified by water movement. It is so strong that under experimental conditions larvae can be induced to leave an unshaded zone of still water in favour of a shaded zone with a current great enough to sweep them downstream. (The author analyses this response in terms of recognized mechanisms of orientation.)

Control by dense shading is therefore due to prevention of oviposition by the gravid female and the sweeping away of larvae by the increased current. The same results may be achieved by exposing the streams

to light and freeing the edges completely of vegetation. (By this means the breeding of *A. sinensis* is excluded naturally from many of the perennial rivers of the foot-hill region.) Which is the better method to employ will depend on local circumstances.

In Part III the author studies the temperature of different types of anopheline breeding place in the field, and the upper temperature limits for the early stages of a number of anopheline species in the laboratory. The absence of *A. sinensis* from shallow stagnant rice fields is related to the fact that during the daytime these collections of water repeatedly exceed 41.0°C the temperature which will kill full-grown larvae of *A. sinensis* in 5 minutes, whereas *A. hyrcanus* and *A. barbatipes* which breed normally in such places, have a thermal death point of 43.5°C., while *A. vagans* which abounds in shallow pools of all kinds, can survive up to 45.0°C. Such high temperatures may still be attained in the fields when the rice shoots, 9 inches apart, are 2 feet high whereas the maximum temperature in the running water breeding places of *A. sinensis* seldom exceeds 35°C. During the night these differences in water temperature no longer hold and yet the egg laying female of *A. sinensis* avoids the stagnant rice fields. By what means she is able to do so is a problem which remains to be solved.

I. B. Wigglesworth.

ZWEMER (R. L.) SIMS (R. A. H.) & COGGESHALL (L. T.) The Plasma Potassium Level during Malaria Infection in Monkeys and Man.—*Amer. J. Trop. Med.* 1940 Sept. Vol. 20. No. 5 pp. 687-701 With 1 chart. [21 refs.]

During malaria infections the rupture of merozoites from red cells releases a toxic substance. Since red cells contain twenty or more times as much potassium as plasma it is possible that potassium is this toxic substance. To test this hypothesis studies were made on thirteen patients undergoing malaria therapy with *P. vivax*. Additional studies were made on rhesus monkeys inoculated with *P. knowlesi*. It was shown that in malaria of man and monkey there is an increase of potassium in the plasma and serum which may come from red cells at the time of sporulation of the parasite or may result from the reaction of foreign protein or toxin on body cells in general. This marked increase in potassium is accompanied by chills and precedes the rise in temperature. The base line potassium values tend to increase with progress of the malaria infection. It is pointed out that marked involvement of the adrenal cortex in some fatal malaria cases is compatible with a disturbance in potassium metabolism.

A. W.

STRATMAN THOMAS (W. K.) & DULANEY (Anna Dean) Immunologic Studies in Malaria with Special Reference to the Diagnosis of Malaria.—*Amer. J. Trop. Med.* 1940 Sept. Vol. 20. No. 5 pp. 717-725 With 1 fig.

In 268 skin tests in cases of malaria the authors failed to obtain a single reaction which could be regarded as specific for malaria, using as antigens a papain digest of human plasmodia [SIXTON & MULLIGAN this Bulletin 1933, Vol. 30 p. 492] watery extracts of blood clots from heavily parasitized individuals [HERMANN & LIFSCHITZ, this Bulletin, 1930 Vol. 27 p. 630] washed red cells from heavily

parasitized blood laked with distilled water saline extracts of parasites centrifuged after laking of red cells NaOH digests of parasites and sera of infected patients.

With various antigens prepared from infected human and from infected monkey blood 388 precipitin tests were carried out, of which 287 were on the sera of malaria patients. No specific precipitin reaction could be demonstrated.

For complement fixation infected and normal monkey antigen and infected and normal human antigen were used. The monkey antigens and the normal human antigen were prepared after the method of COGGESHALL & EATON [this *Bulletin* 1939 Vol 38 p 404]. The infected human antigen was prepared from parasites centrifuged from laked heavily parasitized blood cells. The parasite mass was dried *in vacuo* and ground. A measured amount was rehydrated, frozen, thawed, centrifuged and the supernatant fluid used as antigen. Sixty two patients with malaria and 35 normal persons were tested. Infected monkey and infected human antigens gave identical results. Patients with malaria parasites in their blood at the time the sera were taken gave a significantly higher number of positive reactions than those with no parasites. Patients having fever before sera were taken gave significantly more positive reactions than those who had not had fever. In short the complement fixation test yields highly specific results in malaria with antigens prepared from either human or monkey parasitized blood. N IV

SANFORD (Conley H) CRAWFORD (P T) & WARR (Otis S) **Malarial Coma.**—*Ann Intern Med* 1940 July Vol. 14 (O.S Vol. 19) No 1 pp 72-77 With 1 fig

During five years 1 021 patients were admitted to the John Gaston Hospital Memphis, Tennessee in a comatose condition. Malaria was the cause of coma in 48 of these cases 4.7 per cent. In one year of the five malarial coma cases were as numerous as 8.5 per cent of the total malaria admissions in another as low as 0.9 per cent. Most of the patients with malarial coma were admitted in August and October none was admitted in the months of February to June inclusive. The unusual feature of this series of cases of malarial coma is that three of them were ascribed to *P vivax* infections. Brief notes of these three cases are given. *P vivax* was found in the blood smears. [It might be pointed out that failure to find *P falciparum* in blood smears does not preclude the possibility of a *P falciparum* infection.] The case mortality rate of the series was 40 per cent N H

WILKINSON (P B) **Mental Disturbance after the Exhibition of Atebrin.**—*Caduceus Hong Kong* 1939 Nov Vol. 18 No 4 pp 267-271

Three cases are described in which mental derangement followed the use of atebrin in the treatment of malaria. One patient was Dutch and the other two Chinese the former had a history of previous mental instability. All three made rapid recoveries. The doses of atebrin used were not excessive and none had pigmentation of the skin or gastro-intestinal disturbance. N IV

SHORTT (H. E.) & MENON (K. P.) Attempt to produce Active Immunity to Malaria in Monkeys by Vaccination with Parasitic Substance.—*Jl Malaria Inst of India* 1940 June. Vol. 3. No 1 pp 191-193.

Attempts were made to immunize two monkeys (*Macaca radiata*) by giving them six weekly injections of parasite substance prepared from *M. rhesus* infected with *Plasmodium knowlesi*. The substance was obtained by exposing infected blood to the action of saponin according to the method of CHRISTOPHERS and FULTON [see this *Bulletin* 1940 Vol 37 p 190] by which the red blood corpuscles are destroyed and the parasites liberated. After washing, the parasites, which are still infective are killed by grinding in a mortar with carborundum powder. The ground material was suspended in saline solution and the carborundum allowed to settle. The saline suspension of parasite substance was decanted and was used as the vaccine. Neither monkey developed any effective immunity against intraperitoneal inoculation of the homologous parasite.

C M Wanyon

SHORTT (H. E.) & MENON (K. P.) Experimental Production of Monkey and Avian Malaria by an Unusual Route of Infection.—*Jl Malaria Inst of India*. 1940 June Vol 3. No 1 pp 195-198

The paper describes experiments in which *M. rhesus* were infected with *Plasmodium knowlesi* and fowls with *P. gallinaceum* by allowing heavily infected blood to drop into their mouths, care being taken not to injure the mouth during the administration of the blood and that no obvious lesion existed in the mouth.

C M W

MULLIGAN (H. W.) & RUSSELL (Paul F.) Agglutination of Sporozoites of *P. gallinaceum*. Preliminary Note.—*Jl Malaria Inst. of India*. 1940 June. Vol 3 No 1 p. 199

This is a preliminary note to announce the observation that sporozoites of *Plasmodium gallinaceum* are clumped by normal sera of various animals and man, more readily by sera of animals which have suffered from malaria and most readily by the serum of fowls chronically infected with the homologous parasite. In the last case definite agglutination was observed with a 1/8000 dilution of the serum.

C M W

BLACKWATER FEVER.

PRICES OF ABSTRACTS IN THIS SECTION

FAIRLEY (p. 339) sums up his work on the katabolism of human and monkey haemoglobin when incubated *in vitro* with human or monkey serum. There are three stages (1) The production of neutral or alkaline methaemoglobin (2) the splitting of methaemoglobin into globin and haematin (ferric) and (3) the coupling of haematin (ferric) to serum albumin to form methaemalbumin.

DE NAVASQUEZ (p 340) believes that the mechanical theory of the blockage of renal tubules by methaemoglobin in acid urine as the cause of renal insufficiency in blackwater fever and in incompatible blood transfusion is wrong. In experiments on rabbits into which haemoglobin was injected daily he found that in the three hours following each injection, rabbits secreting acid urine passed methaemoglobin while those secreting alkaline urine passed oxy haemoglobin. Those with acid urine passed more iron than those with alkaline and the author takes this as an indication that in the acid urine group the tubules were not blocked with haemoglobin products so long as there was an adequate flow of urine. He suggests an extreme fall in blood pressure as a cause of anuria in incompatible blood transfusion.

HADEN (p 342) discusses haemolytic anaemia, giving an abnormal shape of the red blood cells as a possible cause of the excessive blood destruction. When a cell is injured it tends to assume a spherical shape, and in haemolytic anaemia there may be congenital spherocytosis—a spherocyte is more easily haemolysed than a biconcave disc since a sphere has smaller surface area than a disc in relation to its volume and cannot therefore undergo as much stretching as a disc.

SZIGETI (p 343) describes the estimation of oxyhaemoglobin and methaemoglobin by means of a photo-electric colorimeter.

DOWDS (p 343) reports blackwater fever in a S African native who had been undergoing treatment with quinine followed by plasmoquine after 3 days treatment with the latter the methaemoglobinuria developed. So (p 344) reports three cases of blackwater fever in which quinine had not been given. Two of the patients had received plasmoquine.

FOY and KONDI (p 344) describe the appearances seen at post mortem of a premature infant born of a woman suffering from black water fever. There was no trace of methaemoglobin and there were no malaria parasites in the blood of the infant though the placental blood was loaded with schizonts of *P falciparum*. It would appear therefore that methaemoglobin does not pass the placenta. The authors discuss possible explanations. C IV

FAIRLEY (N Hamilton) The Spontaneous Disintegration of Certain Blood Pigments, with Special Reference to Methaemalbumin Formation.—*Brit Jl Experim Path* 1940 Aug Vol. 21 No 4 pp 231-242. [11 refs.]

In the introduction to this paper the author briefly reviews the conclusions he has reached regarding the disintegration of certain blood pigments with special reference to methaemalbumin formation. Most of this work has already been published elsewhere and noticed in this *Bulletin*.

The present paper describes the technique used and the actual experiments on which these and subsequent conclusions have been based. The paper is of a somewhat technical nature and must be consulted in the original by those interested.

The following are the summary and conclusions —

(1) When a haemoglobin plasma system is incubated (37 or 40°C.) neutral methaemoglobin is produced in the early stages which is liable to be converted into alkaline methaemoglobin owing to a shift in pH of plasma to the alkaline side of 8.0

" (2) When an aqueous solution of haemoglobin is incubated alone this alkaline shift is absent and only neutral methaemoglobin is demonstrable.

" (3) Where oxalated whole blood is incubated (37° or 40°C.) no alkaline shift in the pH is observed in the sedimented corpuscles which ultimately contain neutral methaemoglobin in the plasma, owing to the alkaline shift, alkaline methaemoglobin is formed.

" (4) If the plasma in the system be derived from man and monkeys a pigment—methaemalbumin—with an α band at 623 μ to 624 μ appears within 48 hours and increases progressively—apparently at the expense of methaemoglobin.

" (5) After a period of incubation at 37°C for 10 days methaemalbumin is present in considerable concentration it can be isolated in the albumin fraction entirely free from haemoglobin or methaemoglobin on drying *in vacuo* over sulphuric acid a brown solid residue is formed containing methaemalbumin which is water-soluble and present in a stable and relatively pure form.

" (6) The conclusion reached is that *in vitro* there are three stages demonstrable in the katabolism of haemoglobin incubated in the presence of human or simian plasma (1) The production of neutral and alkaline methaemoglobin, (2) the splitting of methaemoglobin into globin and haematin (ferric) and (3) the coupling of haematin (ferric) to serum albumin to form methaemalbumin.

" (7) With rabbit plasma and that of many other mammals the pigment produced in the later stages of incubation resembles haematin (ferric) spectroscopically but there is some evidence that even here a haematin-albumin compound is formed.

W Yorks

DE NAVASQUEZ (S) The Excretion of Haemoglobin, with Special Reference to the "Transfusion Kidney"—*Jl Path & Bact.* 1940 Nov Vol. 51 No 3 pp 413-425 With 1 chart. [11 refs]

In 1923 BAKER and DODDS showed that the reaction of the urine which could be controlled by diet was a factor in determining the results obtained by transfusing rabbits with homologous haemoglobin. Thus if the urine were alkaline, as it normally is in a rabbit receiving abundant green food, the haemoglobin was excreted without difficulty and unchanged. If, however it were acid, brown precipitates appeared in the medullary tubules of the kidney brown casts of haemoglobin derivatives, which were thought to be methaemoglobin and acid haematin, occurred in the urine, the urinary secretion was reduced and the amount of urea in the blood increased. It was believed that the basis of this anuria and azotaemia was a mechanical blockage of the renal tubules by methaemoglobin. Similar findings had been noted in man in blackwater fever and as a result of incompatible blood transfusions so that these experimental results have been widely accepted as the explanation of the fatalities which commonly result from the latter. More extended and more recent experiences of this condition have raised doubts if such an explanation suffices.

In the paper under review de Navasquez records three cases of anuria and death following blood transfusions, in spite of the administration of alkalis. He also describes experiments on rabbits, analogous to those of Baker and Dodds which, however have given him quite different results and from which he concludes that the theory of mechanical blockage of the tubules as causal of the renal

insufficiency is wrong. In these experiments de Navasquez used a solution of purified rabbit haemoglobin of 50 per cent. strength (Haldane) which was injected in doses of 10-15 cc. The injections usually were made daily. The urine was obtained by catheter and its iron content estimated. The blood urea was followed and when an animal died or was killed the iron content of one kidney was determined. Most of the rabbits received from two to five injections, the maximum number being thirteen. The animals were divided into two groups, in one of which the urine was kept acid and in the other alkaline. The majority of the animals survived the injections and were killed for examination.

The duration of the experiments was from one day up to several weeks, the longest (on acid producing diet) being nine weeks, the animal receiving thirteen injections of haemoglobin.

[From the estimations of the iron content of the injections the dosage in terms of blood would appear to have ranged from 2.5 cc. to 16.8 cc. and in just over a half of the experiments to have been the equivalent of rather less than 5.0 cc. of blood per animal.]

The results, which are summarized in the paper, show that in the three hours which succeeded each injection the thirteen rabbits which were secreting an acid urine all passed dark-coloured chocolate brown urine, which gave the absorption bands of methaemoglobin. A number lost weight and showed a raised blood urea, but the urinary urea was also raised, the phenol red excretion test was normal and it is stated that there was no oliguria. In rabbits maintaining an alkaline urine the haemoglobin was excreted as oxy-haemoglobin. The phenol red excretion was normal and some animals showed an increase in blood urea.

The excretion of iron differed notably in the two series. In the acid group a mean of 30 per cent. of the injected iron was excreted in the first three hours of the experiment, while in the alkaline group only about 15 per cent. was excreted in the same time. This difference was reflected in the kidneys, those of the acid group becoming iron free in some three to four days, while those of the alkaline group retained iron for considerably longer periods. Histologically Perles's reaction for iron was negative in the acid kidneys, but there was a slight bluish haze in the cytoplasm of the cells of the convoluted tubules in the alkaline kidneys. A precipitate of brownish material was seen in the convoluted and collecting tubules of animals in the acid series which were killed within a few hours of the haemoglobin being injected, and clear reddish matter in these situations in the alkaline kidneys, these findings were no longer present 24 hours after the injections. No other renal changes of importance were noted. The spleen showed free iron, as did the Kupffer cells of the liver in some cases. The liver showed focal necroses in four animals which had received repeated injections of haemoglobin. The rapid clearance of iron from the kidneys of the acid group is taken as evidence against the theory of Baker and Dodds, since if these tubules were blocked with haemoglobin products iron retention would be expected. De Navasquez supposes that the dissolved haemoglobin of an alkaline urine is more freely absorbed in the renal tubules [and retained in them?] than the precipitated haemoglobin of an acid urine. The latter however does not remain in the kidney, but is rapidly removed if there is an adequate urinary flow. To explain the oliguria and anuria of incompatible blood transfusion he

postulates a failure of glomerular secretion but finds no histological evidence of this. He suggests it may be due to an extreme fall in blood pressure.

[Although at first sight they are contradictory it seems possible to reconcile these findings with those of Baker and Dodds. In many cases in which workers at the same problems have got different results in similar experiments the explanation has ultimately been found to lie in a difference in technique. The obvious point upon which information is required, before the two series of experiments can be compared, is the quantity of haemoglobin injected by the different workers. De Navasquez's doses are on the whole moderate, when compared, for example with those given by DeGowin and others (*Arch Intern Med* 1937 Vol. 59 p. 432 1938 Vol. 61 p. 609) in comparable experiments on dogs. The amounts injected by Baker and Dodds are not stated in a form which allows comparison, but it would seem that their doses must certainly have been vastly greater than those given by de Navasquez. If this be the case most of the differences in results may be explained. In comparing such experiments with the effects of incompatible blood transfusion in man the reader is struck with the small amount of incompatible blood which will produce a fatal result in man. It does appear that the earlier workers may have been too ready to accept the attractive doctrine of simple blockage of the renal tubules produced by acid and salt precipitation of haemoglobin products, as a sufficient explanation of the much graver conditions which occur in man in certain cases of transfusion. Recent observations upon anuria in cases of shock treated by transfusions of plasma or serum point to the presence of other factors than simple intravascular haemolysis and kidney tubule blockage. The elucidation of these is one of the problems of the moment.]

J. Henry Dible.

HADEN (Russell L.) Hemolytic Anemia.—*Jl. Lab. & Clin. Med.*
1940 Oct Vol. 28 No. 1 pp. 65-81 With 7 figs.
[18 refs.]

It is difficult to do justice to this interesting and instructive paper in a short abstract and the reviewer feels that he cannot do better than reproduce the author's own summary which is as follows—

"A hemolytic anemia is due to an excessive destruction of red blood cells beyond the compensatory capacity of the bone marrow to deliver new cells.

"The normal red blood cell has a delicate structure which may be injured in many ways. The biconcave shape results in a state of strain in the stroma.

"As erythrocytes are destroyed, iron is set free and bilirubin is formed as the end product of haemoglobin destruction.

"The clinical picture of a hemolytic anemia is an anemia with jaundice and an enlarged spleen.

"The laboratory study in a hemolytic anemia shows a high reticulocyte count from excessive marrow activity, a high icterus index, and a hyperplastic bone marrow.

"The excessive destruction of red blood cells in a hemolytic anemia may result from (1) damage to the red blood cells, (2) an abnormal shape of the red blood cells, (3) a congenital defect in quality of stroma, or (4) an overactivity of the spleen.

"The mechanism of hemolysis varies with the hemolytic agent.

" When a cell is injured it tends to assume a spherical shape since the strain incident to the biconcave shape is released

The most characteristic and clinically important hemolytic anemia is congenital spherocytosis or congenital hemolytic icterus. The inherited defect here is the abnormal shape of the red blood cell.

A spherocyte is more easily hemolyzed than is a biconcave disk.

There is a direct relationship between hypotonic fragility of the red blood cell in spherocytosis and its shape. A sphere has a smaller surface area in relation to volume so it can undergo less stretching before hemolysis occurs than a biconcave disk.

The anemia disappears after splenectomy in congenital hemolytic icterus. The spherocytosis persists, but it is less marked.

Spherocytosis may be acquired since an injury to cells by any agent may cause it. Acquired spherocytosis is characterized by increased fragility of cells.

In many hemolytic anemias there is no abnormality of shape so the hemolysis must depend upon other factors, such as an abnormal reaction changes in the cell membrane stroma, or constituents of the plasma, or abnormal reticulo-endothelial activity.

In sickle-cell anemia and in the erythroblastic anemia of Cooley there seems to be a congenital defect in the stroma which allows the cells to be easily hemolyzed abnormally.

If hemoglobinuria is present in a hemolytic anemia, the cells are being destroyed in the circulating blood and not in the spleen.

With hemoglobinemia and hemoglobinuria, splenectomy is contra-indicated.

W 1

[This paper is not concerned directly with blackwater fever but it is of sufficient interest to warrant its inclusion in this section—Ed.]

SZIGETI (B) Estimation of Oxyhaemoglobin and of Methaemoglobin by a Photoelectric Method—*Biochem J* 1940 Nov Vol. 34 Nos. 10 & 11 pp 1460-1463 With 1 fig

The author states that the oxyhaemoglobin content of blood can be rapidly and accurately measured by means of a photoelectric colorimeter. In the absence of oxyhaemoglobin or of other pigments methaemoglobin can be determined in the same way and in whole blood the presence of met- or of sulph-haemoglobin or of other pigments can be detected. It was found that the use of 0.4 per cent ammonia as a diluent for blood for spectrophotometric measurements is not safe and that better results can be obtained with a concentration of 0.04 per cent ammonia.

The photoelectric colorimeter used was a Hilger Absorptiometer (Hilger 1836) and the method adopted is described in detail. The subject is rather technical and the original should be consulted by those interested.

W 1

DOWDS (J H) Blackwater Fever in an African Native.—*South African Med J* 1940 Sept 28 Vol. 14 No 18. p 365

The author states that this is the first case of blackwater fever encountered in the course of ten years among a native population averaging about 15 000 in a malarious country in which the disease is common among the small European population.

The patient was 25 years of age and had lived all his life in the district. After he had been in hospital for a week undergoing treatment for a recently acquired simple conjunctivitis a routine blood

examination revealed a few malignant tertian rings and crescents. The temperature had been normal throughout his stay in hospital. Quinine gr 30 was given for seven days, followed by plasmoquine 0.02 gm. thrice daily. After three days' treatment with the latter he passed a large quantity of dark brown urine containing methaemoglobin. The temperature rose to 103° the pulse to 130 and the patient vomited frequently during the next 24 hours. The following day the vomiting ceased, and a mild degree of jaundice was noted. The methaemoglobinuria continued for three days, at the end of which the haemoglobin was reduced to 32 per cent. The convalescence was uneventful. [Probably the plasmoquine had something to do with the development of methaemoglobinuria in this case.] IV Y

So (Tei) Cases of Blackwater Fever without Administration of Quinine.—*Taiwan Igakka Zasshi* (Jl Med Assoc Formosa) 1940 Nov Vol 39 No 11 [In Japanese pp 1850-1861 (32 refs)] English summary pp 1861-1862.]

Details are given of three patients who were stated to have developed blackwater fever without previous administration of quinine. The first patient suffered from malignant tertian malaria, and was treated with atabrin and subsequently with plasmoquine 0.03 gm. daily. After three days of plasmoquine he suddenly developed blackwater.

The second patient a man of 63 was admitted to hospital with enteric fever. He gave a history of having previously suffered from malaria for several years. When recovering from typhoid he suddenly had a rigor with high fever and next day was found to be suffering from blackwater fever. Examination of the blood showed malarial parasites as was expected [sic]. This patient had apparently not received any of the usual malarial remedies, e.g. quinine atabrin or plasmoquine, before the blackwater developed.

The third patient was apparently suffering from her first attack of malaria when admitted to hospital. She was treated with atabrin 0.3 gm. plus plasmoquine 0.03 gm. daily. On the fourth day she developed haemoglobinuria and was found to be suffering from blackwater. [It is impossible to comment on these cases, but it seems possible that in two of them plasmoquine may have had something to do with the development of methaemoglobinuria.] IV Y

Foy (Henry) & Koudi (Athena) A Case of Miscarriage following Blackwater Fever.—*Trans. Roy Soc Trop Med. & Hyg* 1941 Jan 31 Vol. 34 No. 4 pp 343-346.

Details are given of a case of blackwater fever in a pregnant woman who gave birth to a seven months child, which died shortly afterwards, thus enabling post mortem examination of the child and the placenta to be made.

The placenta was intact and appeared normal. The blood was withdrawn from it and centrifuged. The serum was reddish-brown and contained haemoglobin and methaemalbumin. The placental blood was loaded with schizonts of *P. falciparum*. The child had been dead for 6 hours when it was examined. It appeared to be a normal, well formed, seven months male child. There was no icterus. The serum, which was obtained with difficulty

was clear but spectroscopically showed a faint band of haemoglobin in a cell 5 cm thick this was no doubt traumatic. There was no trace of any methaemalbumin nor was there any sign of malaria parasites or of pigment in the infant's blood or spleen.

The mother's blood examined after the birth contained both haemoglobin and methaemalbumin, and the urine contained haemoglobin and methaemoglobin. From this case it would appear that methaemalbumin does not pass over the placenta to the child.

The authors consider that the absence of any sign of haemolysis in the child may be explained on the hypothesis —

(a) That any haemolysins circulating in the mother did not pass through the placenta to the child.

(b) That any haemolysin present in the mother was only there in sufficient concentration to bring about haemolytic process in the mother and none was available to produce a haemolytic process in the child.

(c) Assuming that malaria parasites or their metabolic products are necessary for the production of blackwater fever then the absence of all traces of parasites and malaria pigment from the baby may account for the absence of all signs of haemolysis in the child. Further sensitization of the mother did not appear to affect the child.

(d) That the cells of the mother were more liable to haemolysis than those of the child or had been sensitised by parasites or their metabolic products.

IV Y

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES XXXVII *

Muco-purulent Conjunctivitis in Ceylon has been described by DE SILVA.¹ A particularly severe epidemic occurred in Kandy from April to July in 1940 4,329 patients being treated during that period. The Koch Weeks bacillus was the micro-organism chiefly responsible for the trouble. In addition to the common necrotic spots of corneal epithelium corneal ulcers seem to have been met with, and these tended to perforate in debilitated subjects. Painting the lids with 2 per cent. silver nitrate followed by a douche of boracic acid lotion and the instillation of 2 per cent. mercurochrome drops was the routine treatment adopted for the conjunctivitis. (The daily instillation of nitrate of silver drops 3 grains to the ounce and the use of a simple eye lotion will usually cure a Koch Weeks catarrh in five days.)

Trachoma.—WRIGHT² has given a further account of his experimental work in connexion with the implantation of filtered and of unfiltered trachoma material on the chorio-allantoic membrane of fowl embryo and on the human conjunctiva. Results as regards the chick membrane were inconclusive. With respect to the human conjunctiva fourteen positive results were obtained in twenty two individuals inoculated with unfiltered trachoma material. Filtered material was instilled in the normal conjunctival sac of five individuals

¹ DE SILVA (R. J. L.) A Study of an Epidemic of Muco-purulent Conjunctivitis at the Eye Institute Civil Hospital, Kandy.—*Jl Ceylon Branch Brit Med Assoc* 1940 Sept. Vol. 37 No. 3 pp. 159-170 With 1 fig.

² WRIGHT (R. E.) Trachoma.—*Brit Jl Ophthalm.* 1940 Nov Vol. 24 No. 11 pp. 547-550

* For the 36th of this series see Vol. 37 pp. 871-874

on nine occasions with negative results. One individual, negative on three occasions to filtered material, subsequently proved positive to unfiltered. Though his experiments failed to disclose the nature of the infective agent in trachoma Wright was able to draw from them some valuable conclusions: (1) Trachoma is not ordinarily a very infectious disease. (2) clinical or experimental observations in connexion with the disease are so liable to fallacious interpretation that they are likely to lead to erroneous conclusions unless very carefully controlled. (3) correct conclusions cannot be drawn from an insufficient number of observations. (4) the nature of trachoma perhaps more accurately regarded as a congeries of trachomatous affections of the conjunctiva, still remains obscure. There is a widespread divergence of opinion in the diagnosis, and empirical treatment may often be more dangerous than the condition it attempts to relieve.

The fact that the caruncle and plica semilunaris may often escape treatment in trachoma and may therefore remain a source of irritation after the rest of the conjunctiva is cured has been referred to by OLAR.³ He advocates expression of the structures and for this purpose makes an incision in the bulbar conjunctiva, in the neighbourhood of the caruncle through which he passes one blade of a special expression forceps and is thus able effectively to squeeze the parts.

Cornea.—HAMILTON⁴ has reported the occurrence of an epidemic of *superficial punctate keratitis* in Tasmania. Altogether 92 cases were seen. Petechial spots on the skin surface of the lower lid were frequently observed and an actual herpes on the lids was seen in two of the patients. All were completely free from iritis. Painting the conjunctival surface of the lids with 2 per cent silver nitrate was found to be a most effective treatment.

Iris.—The rôle played by tuberculosis in the aetiology of chronic irido-cyclitis has been discussed by BROOKS, JULER & WILLIAMS.⁵ The authors investigated forty cases of chronic irido-cyclitis of which most were kept under observation for several years and none for less than six months. Improvement in radiological technique during recent years has rendered the diagnosis and recognition of intrathoracic lesions much easier and some observers have claimed that many children and nearly all adults possess a focus of infection—usually healed. Clinical and radiological evidence of tuberculosis somewhere in the body was present in twenty-five of the forty patients under review. The authors consider that, while local sepsis may be a factor in some cases of chronic irido-cyclitis, its importance in the aetiology of the disease has probably been exaggerated. Experience of tuberculin and ultra violet light in treatment proved on the whole unfavourable. Prolonged rest in bed for a period of at least six weeks was found to be far the most useful therapeutic measure. Local treatment followed the usual lines.

Lens.—The association of certain morbid skin conditions with diseases of the conjunctiva and the cornea (e.g. seborrhoea and acne

³ OLAR (Emil). *Encysted Trachomatous*.—*Arch Ophthalm* 1940 Oct. Vol. 24 No 4 pp 772-783. With 8 figs.

⁴ HAMILTON (J Bruce). A Survey of Superficial Punctate Keratitis in Tasmania with the Record of a Mild Epidemic.—*Bru J Ophthalm*, 1941 Jan. Vol. 25 No 1 pp 1-17. With 6 graphs & 1 map. [17 refs.]

BROOKS (W D Wykeham), JULER (F A) & WILLIAMS (E Robin). On the Relationship between Chronic Iridocyclitis and Tuberculosis, and the Appropriate Therapy.—*Bru J Ophthalm* 1940 July Vol. 24. No 7 pp 317-308. With 22 figs. [44 refs.]

rosacea) is well established and it is likely that a systemic disturbance affecting the skin might injuriously affect the lens since both structures have a common origin from the surface ectoderm. MILNER⁶ has recorded the development of double cataract in a man aged 26 who had been subject to attacks of allergic eczema for many years. A remarkable feature of the case was the exceptionally rapid development of the lenticular opacities in one eye.

The annual Report of the Madras Government Ophthalmic Hospital for the year 1939⁷ contains no clinical reports and consists chiefly of tabular statements. The figures it presents are impressive: 38,396 out patients, 5,572 in patients, 8,893 operations. Of the operations 2,353 were for senile cataract—112 intracapsular, 2,179 combined capsulotomy and 62 simple. 677 lachrymal sacs were excised and 899 operations for the relief of glaucoma were performed. Treatment was given in 240 cases of keratomalacia. Only 116 patients were treated for superficial punctate keratitis during the year. Sun injury to the macula were seen in 54 cases. The cost of the institution amounted to about £10,500.

H Kirkpatrick

⁶ MILNER (J. G.) Allergic Eczema and Cataract.—*Brit. Med. J.* 1941 Mar 8 pp. 356-357.

⁷ MADRAS Annual Report and Statistics of the Government Ophthalmic Hospital Madras, for the Year 1939—10 pp. 1940 Madras Govt. Press. [8 annas.]

MISCELLANEOUS

DIWANY (M.) Sternal Marrow Puncture in Children.—*Arch. Dis. in Childhood* 1940 Sept Vol. 15 No 83 pp 159-170 With 7 figs.

From a study of sterna at different ages it was found that the best site for puncture in children is the centre opposite the second intercostal space. After local anaesthesia a shortened lumbar puncture needle with a movable shield is inserted into the marrow cavity. The shield is fitted at 0.5-0.8 cm. from the point according to age and amount of subcutaneous fat. To obtain sufficient suction a 10 cc. syringe is used to aspirate 0.1-0.2 cc.

The small amount of previous work on normal marrow of children is discussed and tables are given of the author's results with 5 infants and 10 children. The total nucleated cell count was 75,000-160,000 per cmm. myeloid elements predominated, eosinophil percentage was high (the range was 1.5 to 13), lymphocyte percentage was mostly high (12-37.5), cells of red series varied between 5 and 18.5 per cent. and were mostly erythroblasts. myeloblasts were 0.25 to 2 per cent. megakaryocytes were always present. Nine out of ten cases of ankylostomiasis showed marked hyperplasia. Iron therapy after carbon tetrachloride brought the marrow to normal. Ascariis infections produced no characteristic picture. Bilharziasis showed eosinophils between 10 and 15 per cent. in 4 cases and 60 per cent. in one. In two cretins the marrow was hypoplastic, and in one treatment improved the cell picture.

W. P. Kennedy

CHRISTOPHERS (S. R.) [F.R.S., I.M.S. (ret.)], SIXTON (J. A.) [M.D. D.Sc., I.M.S. (ret.)] & COVELL (G.) [M.D. D.P.H. I.M.S.]
 How to do a Malaria Survey Fourth Edition. Revised by
 Lt.-Col G COVELL, I.M.S. Director Malaria Institute of India.—
Health Bull. No 14 Malaria Bureau No 8 pp vi+208.
 With 13 plates & 3 figs 1939 Delhi Manager of Publications.
 [Rs 1-12 or 2s. 6d.]

The fourth edition of this valuable book has been revised by
 Lieut.-Col. G. Covell and is now issued bound in stiff boards, a useful
 point in a book which must be constantly used for reference purposes.
 There has been little change made in the subject matter but certain
 information has been brought up to date. C IV

BARRAUD (P. J.) [F.R.S., F.Z.S., F.L.S.] A Practical Entomological
 Course for Students of Malariology Second Edition. Revised
 by I. M. PURI M.Sc. (Punjab) Ph.D. (Cantab.) F.R.S., etc.—
Health Bull. No 18 Malaria Bureau No 9 pp vi+143. With
 208 figs on 18 plates 1939 Delhi Manager of Publications.
 [Rs 1-12 or 2s. 6d.]

This Bulletin has been revised and the order of the lectures has been
 slightly rearranged. It remains a full and detailed course of
 entomology for students of malariology in India, which must be
 invaluable for students in that country and in its scope it closely
 resembles the first edition. The binding might be improved—the
 book will not lie open, which must be a trial to those who must
 constantly refer to it in practical work. [See this Bulletin 1935
 Vol. 32, p. 303 for a review of the first edition.] C IV

SIXTON (J. A.) [M.D. D.Sc. I.M.S.]. What Malaria costs India.—
Health Bull. No 26 Malaria Bureau No 13 pp ii+127
 With 1 fig 1939 Delhi Manager of Publications. [Amas
 14 or 1s. 3d.]

The subject matter of this Bulletin was originally published in the
Records of the Malaria Survey of India and reviewed in this Bulletin
 1936 Vol. 33, p. 752. The three original papers have now been
 condensed, largely by omission of matter dealing with conditions
 outside India, and are published in one volume. The immense
 importance of the subject to India demands the widest circulation. C IV

TROPICAL DISEASES BULLETIN

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[No 7

THE NOMENCLATURE OF THE FILARIA OF THE PACIFIC PRODUCING NON PERIODIC EMBRYOS (*WUCHERERIA PACIFICA*)

By Sir Philip MANSON BAHR, C M G D S O M D F R C P

The recent discovery by RAO and MAPLESTONE (1940) of the adults male and female of *Filaria malaysi*, the embryonic form of which was originally described by BRUG in 1927 has opened the question regarding the nomenclature of these filarial nematodes

Contrary to expectation the adult form of this filaria, so far from resembling *Loa loa* as had been imagined from the morphological characteristics of the embryo closely resembles that of *Wuchereria bancrofti* differing only in minute and not readily ascertainable details (such as the breadth of the spicules of the male). According to the rules of zoological nomenclature *Filaria malaysi* shall henceforth be known as *Wuchereria malaysi* (Brug 1927) Rao and Maplestone 1940 (cf Clayton LANE this Bulletin 1941 Vol. 38 p 152). The chief grounds for specific rank are based upon the morphological distinctions of the embryo and its development in mosquitoes of the genus *Mansonioides* which have a limited geographical distribution in Ceylon, Malaya and S China, and also a peculiar habitat.

It is therefore now open to question whether morphological distinctions in adult filarial nematodes are of themselves sufficiently valid in the zoological sense as a mark of specificity. Pathological effects peculiar geographical distribution and selective capacity for insect intermediaries may henceforth be considered to be of determinative value. This criterion now applies apparently to what has so far been regarded as the non-periodic form of *Wuchereria bancrofti*. The adult forms of the non periodic filaria which were obtained by the writer in Fiji are indistinguishable on morphological grounds according to Prof. R. T. LEIPER, from those of the type species—*Wuchereria bancrofti*—with nocturnal periodic embryos. This feature was at that time (1912) employed as an argument in favour of its identity with this type but in view of these recent developments other characteristics appear to be sufficiently valid for recognition of specific status to yet a third species of *Wuchereria* in man for which the name *Wuchereria pacifica* is now proposed and of which the intermediary mosquito host is *Aedes variegatus* (Doleschall 1858) *

Formerly known as *Strogomyia pseudoscutellaris* Theo. 1910

The non-periodic character of the Pacific microfilaria was first described by V. G. THORPE (1896) from specimens collected in Tonga and Fiji. He found, to his astonishment, that the embryos occurred in large numbers in the blood both by day and by night. Subsequently in Fiji G. W. A. LYKCH (1905), A. D. BRUNWIN (1909) and B. M. WILSON (1909) drew attention to the same phenomenon as well as to the apparent identity of the microfilariae with those of *W. bancrofti*. This again was abundantly confirmed by the writer (1912) and, as already stated, the parental stages proved to be identical with those of the classical type and there is now no reasonable doubt from re-examination of the original specimens that the microfilaria is identical with that of the periodic *W. bancrofti*. From the contiguous island of Samoa non-periodic microfilariae were demonstrated in Hamburg by F. FULLEBORN (1912) who showed conclusively that, in some natives from that island who were visiting Germany, this lack of periodicity was entirely unconnected with the waking or sleeping habits of the human host as had been suggested by MANSON. This subject was also fully investigated by LEHR and v. PROWAZEK (1911) in Samoa itself.

Similar microfilariae were found in the Wallis Islands by BROCHARD (1910), in Tahiti by DUBREUIL (1909), in the southern Cook Islands (Rarotonga and Aitutaki) by A. McKENNIE (1925), by S. LAMBERT (1928) and by G. H. E. HOPKINS in Tongatabu, Haapai, and Vavau of the Tonga group (see BUXTON 1928). According to A. BREINL (1915) there may also be localities in S. New Guinea where the non-periodic microfilaria also occurs. F. W. O. CONNOR (1923) found it abundant in the Ellice and Tokelau Islands, in the latter of which *Aedes variegatus* is the only mosquito known. According to LAMBERT (1924) this form of filariasis is known in the S. Gilbert Islands, where however an extensive survey has not so far been made. According to P. A. BUXTON it is known to be present in the Society Islands and in the whole of Polynesia, but, on the other hand, the nocturnal periodic *W. bancrofti* prevails in Melanesia and Micronesia, the Bismarck Archipelago, New Caledonia, Solomon Islands and New Hebrides. Buxton has indicated that in an eastward direction this nocturnal form is limited by the longitude of 170°E but that further than that the filaria is non-periodic.

In 1908 P. M. ASHBURN and C. F. CRAIG described a single case in the Balibid prison in Manila of a non-periodic microfilaria which they named (on its embryonic characteristics) *Filaria philippinensis*. Subsequently E. L. WALKER (1914) found four other examples, but on examining adult filariae extracted from Filipinos identified them as morphologically similar to *W. bancrofti*. According to J. M. PHALEN and H. J. NICHOLS (1909) the nocturnal periodic microfilaria is the most widespread variety in the Philippines, the non-periodic being quite exceptional. However in view of recent developments, I have re-examined the photomicrographs which illustrate Ashburn and Craig's paper and it is possible that, from the specific characteristics which they depict, they may have been describing *Microfilaria malays* in which the periodicity, for some reason or other, may have been disturbed. At any rate, at this distance of time, this is a most difficult question to settle as the embryos were in such small numbers in the bloodstream that it was difficult to determine fluctuations in numbers. It has not been possible to find out whether, under laboratory conditions, *W. malays* can develop in *Culex fatigans*. The comparative

tightness of the sheath at the posterior end of the microfilaria and the arrangement of the nuclei at the head resemble *Microfilaria malays*. Some reasonable doubt may therefore be entertained whether this Philippine non periodic microfilaria is indeed identical with the Pacific form.

As an attempt to explain the non periodic character of the Fijian filaria I originally suggested (1912) that this feature was an adaptation to the habits of the mosquito intermediary in the Pacific—*Aedes variegatus*—which is a day biting species. Since that time it has been firmly established (Buxton) that this is the only efficient intermediary in the whole of the Pacific area, whilst he and O Connor have shown too that in many of the smaller atolls (such as the Tokelau group) it is the only species of mosquito to be found, and further that whilst other species such as the night biting *Culex fatigans* and *Aedes aegypti* are importations, *A. variegatus* must be regarded as an original inhabitant of the Polynesian islands. It is significant too in this respect that O Connor found the microfilaria rate in the Ellice Islands to be in direct relationship to the prevalence of *A. variegatus*. In Nukulalai or Mitchell Island where conditions are unfavourable to this mosquito the filarial incidence is the lowest in the group.

P A Buxton in his great work in the Pacific (1928) has advanced the theory that a gradual conversion from nocturnal to non periodicity took place it being assumed that the nocturnal microfilaria was brought by the original immigrant Polynesians who came from S.E. Asia into the Pacific. Here people left a country rich in mosquitoes for one in which remarkably few occur as there are only six indigenous species in the whole of Polynesia. *Aedes variegatus* never bites at night but most avidly in the early morning and towards dark at a time when only a few microfilariae are present in the blood of a nocturnal infected individual just prior to the midnight swarm. The mosquitoes (*A. variegatus*) thus gradually became infected and the filaria, previously nocturnal in habit then became non periodic and adapted to this particular mosquito as its normal intermediary. It appeared to Buxton's sense of reasoning that in this manner the mystery of the non periodicity of the microfilaria in Polynesia could be most satisfactorily explained. But one may add that if that adaptation were so perfect why did not the periodicity become entirely diurnal?

The range of the non-periodic Polynesia filaria is as far as is at present known coextensive with that of *Aedes variegatus* (and its varieties) with the possible exception of the Philippine non periodic filaria described by Ashburn & Craig to which reference has already been made.

There are however still some disquieting facts which should temper judgment. Buxton has established that *Aedes variegatus* is present in the Bismarck Archipelago Solomon Islands and New Hebrides where the nocturnal microfilaria abounds though it is possible that future research may indicate that both forms nocturnal and non periodic are present in this area, just as *W. malays* and *W. bancrofti* are in Ceylon and Malaya. He gives a table showing that —

Aedes variegatus var *longae* occurs in Tonga.

A. v. hybridus in the New Hebrides.

A. v. pseudoscutellaris in Fiji, Samoa, Cook Islands Society Islands Marquesas Tokelau and Paumotu Groups.

The adaptation of the non-periodic microfilaria to *Aedes variegatus* is so complete as was demonstrated by the writer in Fiji that development

to full capacity takes place in that insect to an extent not previously known in the transmission of the nocturnal microfilaria in the night-feeding *Culex fatigans*. Now we learn that the historic vector of nocturnal filariasis *Culex fatigans* (Buxton & Hopkins 1927) is a recent introduction into Polynesia and is still to be found principally in harbour towns and foreign settlements, but not in the more remote islands. In Fiji the writer was able to show that the non-periodic Polynesian microfilaria does not develop readily in this mosquito any more than it does in the second imported species—*Aedes aegypti*.

Most significantly too O'Connor in 1920 in the most heavily infected island—Funafuti—did not find a single example of *Culex fatigans* out of a large number dissected infected with this filaria under natural conditions. In other words, neither of these insects is an optimum host for the parasite.

But here we are presented with a difficulty in the complete understanding of this puzzling problem because it was shown that *Aedes variegatus* is a satisfactory host for the nocturnally periodic filaria of those Indians and Solomon Islanders who had recently arrived in Fiji. It would appear justifiable from this evidence to assume (1) that the adaptation of this filaria to *Culex fatigans* has been lost from long-standing lack of opportunity, or (2) that such an adaptation has never in fact existed. The latter seems to offer an additional and reasonable basis for regarding the non-periodic microfilaria as a species distinct in the biological sense.

We are faced with some additional facts about which some adequate explanation must be offered. I was able to prove that, in immigrants who normally harbour the nocturnal form and who had been long resident in Fiji, the non-periodic microfilaria alone could be demonstrated. The assumption here would seem to be (1) that the original nocturnal periodicity had been disturbed as the result of adaptation to a new intermediary—*Aedes variegatus*—a hypothesis which is assuming intelligent foresight on the part of a lowly nematode parasite as suggested by Buxton, or (2) that these natives had become infected with the local species of filaria during their residence in Fiji.*

This riddle can be finally and definitely solved solely by continuous observation, under controlled conditions, of a nocturnally-infected individual in Polynesia over a considerable number of years, but the second assumption appears at present to be more likely because the writer found absolute nocturnal periodicity in two Solomon Islanders who had resided in Fiji ten years.

Therefore periodicity is not lost by residence and intimate contact with *A. variegatus*. *Per contra* I found nothing but the non-periodic microfilaria in Europeans long resident in Fiji, who had contracted their infection there and also in other immigrant races such as Indians and Melanesians who had been born and bred in the islands or who had been in the islands since their youth.

Other important aspects of this question lie in the pathological effects produced by the non-periodic filaria and whether these considerations can influence final judgment. That the Pacific filaria is the main agent in the production of elephantiasis there can be no reasonable doubt. There are, however, some other suggestive features. Elephantiasis of the arms is more common in the Pacific, as I have

* See also statement by H. H. Scott (A History of Tropical Medicine Vol. II, p. 1069) wherein the same point of view is ably expressed.

shown than in other areas where typical *W bancrofti* is common so also as Buxton remarks, is elephantiasis of the breasts. The very considerable glandular enlargements which are associated with the Polynesian filaria have arrested the attention of many observers. The writer originally noted hypertrophy of the epitrochlear glands in infected Fijians and this has been abundantly confirmed by O Connor Buxton and others. Enlargement of these glands is not commonly associated with *W bancrofti* filariasis in other parts of the world but such a generalization cannot be considered to be complete in view of the fact that Buxton found quite a proportion of New Hebrideans infected with nocturnal filariae to have enlarged and palpable epitrochlears. Another remarkable feature of non-periodic filariasis is the rarity of chyluria and lymphuria in Polynesia. My experience led me to believe that these phenomena are extremely rare in Fiji and they are according to Buxton very exceptional in Samoa though A F MACKAY (1927) recorded one interesting case in that island. Chyluria, on the other hand, is of comparatively frequent occurrence in nocturnal periodic *W bancrofti* infections in Egypt India the West Indies and in S America.

We see from this brief statement that non-periodic filariasis presents some distinctive clinical features as in the somewhat parallel case of *W malayi* filariasis. To these peculiarities may be added the large number of non periodic microfilariae which are found in the blood-stream in the absence of any physical signs of disease.

Assembling all these factors and in the light of recent developments of our knowledge of this genus of Filariae I believe that the recognition of the Polynesian filaria as a separate species in the biological sense would best fit all the hitherto known facts and the name *Wuchereria pacifica* is now proposed as being most descriptive of the filaria in the Pacific and its adaptation to *Aedes variegatus*—an insect indigenous to this area.

It may be argued that *W pacifica* is not a well established species in the sense that *W bancrofti* and *W malayi* may be considered to be. The probability is that it is a species in the process of evolution and represents the primitive filaria of the Polynesian which on account of its geographical position has become isolated in the zoological sense and biologically adapted to its surroundings but whether it is the more primitive form of *Wuchereria* and the nocturnal periodicity a subsequent development is a matter for future investigation. The periodic or non periodic habit of microfilariae in the blood stream has received recognition from systematists in assessing specific characters as in the well-known cases of *Loa loa* and *Acanthocheilonema perstans*. If this conception is correct then the fact of the lack of filarial periodicity in Indian and Solomon Islanders long resident in Fiji, who have thus become infected during their sojourn with the non periodic local species *W pacifica* becomes more intelligible.

It is regretted that so far from simplifying the problem underlying the mechanism of filarial periodicity this exposition has rendered it even more complex. In the present state of knowledge we cannot say more than that periodicity is a primary principle ramifying throughout the whole of Nature. We see it in the periodic cycles of intra corpuscular plasmodia, in the migration of birds and fishes the swarming of bees the efflorescence of flowers and in many other ways. Periodicity is an inherent quality and as such is distinctive to a species as is any structural feature.

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SUMMARY OF RECENT ABSTRACTS *

VI PLAGUE

Epidemiology and Epizootology

HAMPTON (p. 822) gives the history of plague in the United States. Since its introduction there have been 499 cases in eight States, but sylvatic plague is widespread in the west and many rodents have been found infected. Fleas, lice and ticks from these rodents have been shown to harbour the bacilli.

MACCHIAVELLO (p. 424) has studied the epidemiology of plague in Chile. It has been characterized by acute outbreaks followed in successive years by outbreaks of decreasing intensity until, in some localities, it has completely disappeared. But this cycle has been repeated time after time and the author considers that it is not a question of recrudescence from the rat reservoir but a reintroduction from abroad—for instance of plague fleas in bales of jute from India—starting an epizootic which leads to human disease. In Chile the same author (p. 425) reports on the results of rat examinations. In 88 rats from which the bacilli were isolated, 5 had acute disease, 64 were in chronic or subacute stages and 19 showed no lesions. This indicates the presence of healthy rat carriers and the author draws the conclusion that the total rat population of places in which plague has broken out should be destroyed. In a village in the State of Rio de Janeiro PINOTTI *et al.* (p. 824) describe a small outbreak which was preceded by an epizootic in rats. This was regarded not as an exacerbation of enzootic disease but as a new importation from Rio de Janeiro.

In the province of Chimborazo, Ecuador SUÁREZ (p. 423) reports an outbreak of 16 cases of pneumonic plague. The area is sparsely populated and he states that both the rat and the flea ordinarily concerned in the spread of plague are not present. Plague however is endemic, with epidemic outbreaks in which some of the cases present throat symptoms. The author has found plague bacilli in throat

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

smears of several persons in contact with cases of plague and has confirmed their identity by culture and animal inoculation. He believes that such latent cases may account for outbreaks by man to man transmission, and that prophylactic measures should include search for and treatment of human carriers. [It would be instructive to know for how long these bacilli remained in the throats of contacts.] DE LA BARRERA (p. 423) reports an outbreak in the Mendoza province of the Argentine where sylvatic plague is present. In this instance a human case of septicaemic plague terminated in pneumonia and was followed by eight other cases of direct infection. [It would seem possible that this course of events might explain the outbreaks described by SIÁRES above though he does not mention sylvatic plague.]

Two foci of plague are reported from the Belgian Congo one in the region of Butembo to the west of Lake Edward (VAN HOOF p. 419) the other near Lake Kivu (VAN RIEL and MOL p. 419). The latter probably belongs to the group of places on the borders of the Congo Uganda, Kenya and Tanganyika in which plague is endemic. DEVIGNAT (p. 828) describes his method of inoculating guinea-pigs subcutaneously with marrow aspirated from the bones of captured rats. By this means the plague area round Lake Albert (Belgian Congo) has been defined. *Mastomys ugandae* is the domestic rat of this region and 287 962 of these rodents were dealt with in this fashion. In some places apparently healthy rats were found to be infected [see also Macchianello above]. VAN HOOF (p. 419) reports that in the Belgian Congo *P. pestis* has been isolated from rodents of the genera *Mastomys*, *Leggadina*, *Agricanthus*, *Lemnicomys*, *Lophuromys*. VAN RIEL and MOL (p. 419) state that *Mastomys ugandae* and *Rattus rattus alexandrinus* are carriers in the Kivu area of the same country.

LAMBORN (p. 824) reports a small outbreak in a village near Blantyre Nyasaland, which had been preceded by a mild enzootic in field rodents.

GIRARD (p. 829) records rat plague in a district of Madagascar which has persisted for 12 years and has given rise to occasional cases in man.

ROSIER (p. 425) gives the incidence of plague in Java in 1938 as 2,107 cases although the epidemic (which is diminishing) is essentially one of bubonic disease: there were 202 cases of primary pneumonic plague of which 48 occurred in one outbreak.

MEYER (p. 424) reports that Wyoming and New Mexico have recently shown plague infection of wild rodents and states that it has once more been found that the inoculation of guinea-pigs with pooled fleas, bco and ticks has yielded more information than the examination of shot or trapped rodents. MILLER (p. 823) writes of the possible spread of sylvatic plague from the United States to Canada and states that already an infected gopher *Citellus r. richardsoni* has been found in Alberta.

SÁENZ VERA (p. 824) considers that in S Ecuador plague is endemic in field rodents and that there is a link between these rodents and man. This link is probably the cm, a small rodent of the hamster type [the name is used for *Microcavia australis* and *Graomys griseoflavus*]. Human plague is here a rural disease and does not occur in epidemics. This is probably due to the fact that the rat population inhabits fields where food is abundant, and there is no need for field rodents to resort to inhabited centres for food. In the *Boletín Semanario* Buenos Aires (p. 424) it is stated that extensive sylvatic plague has been found in the Province of Salta, Argentine the rodent concerned was of the genus

Sylvilagus Man may be infected directly from these rodents, but more usually the domestic rat becomes infected through its habit of feeding on dead animals and passes the disease to man. DE LA BARRERA (p 423) in the Mendoza Province of the Argentine shows that *P. pestis* has been isolated from cuis of the genera *Microcavia* and *Galea*, *Graomys griseoflavus* *Mus musculus* and *Lepus europaeus*. The original infection of wild rodents probably came from domestic rats.

YOKOYAMA (p 427) reports that in Manchuria ground squirrels of the genus *Citellus* are numerous and play the chief part in the transmission of plague. Black rats are rare and the Tarabagan is not found.

Transmission

RAO (p 418) discusses *Xenopsylla astia* a notoriously inefficient vector of plague though capable of transmitting it experimentally. He thinks that one reason why it is inefficient in nature is probably that it is highly susceptible to adverse climatic conditions, especially high temperature and low humidity.

VAN HOOFF (p 419) reports that *P. pestis* was found in the Belgian Congo near Lake Albert in fleas of various species *Xenopsylla brasiliensis* *X. cheopis* *Ctenocephalus canis* *Sarcopsylla* and *Ctenophthalmus*. There is another small focus near Lake Edward, but *X. cheopis* is not present and this may account for the limited spread there.

DE LA BARRERA (p 423) states that *Parapsyllus* and *Rhopalopsyllus* fleas of wild rodents in the Argentine have been shown capable of transmitting plague to man.

Aethology

RAO (p 826) defines a bacterial growth factor as a substance without which no growth will take place. There are two main types: simpler molecules such as the amino acids, and more complex molecules like thiamin and nicotinic acid. Only three amino acids are indispensable to *P. pestis*: proline, phenylalanine and cystin, and the complex factors are not indispensable but have a stimulatory action on metabolism and growth. Several growth factors or coenzymes were tested for stimulatory activity. Haematin, cozymase, thiamin and nicotinic acid all stimulate the respiration of *P. pestis*. These may be essential components of the bacillus synthesized in the course of growth.

SOKHEV (p 825) has shown that *P. pestis* is definitely a capsulated organism and that the capsule is present whether the strain is virulent or avirulent. The envelope (which is distinct from the capsule) appears to be nothing more than a peculiar settling down of the fine particles of India ink at a distance from the capsule due to the operation of physical forces [this view does not appear to accord with that of BHATNAGAR, this *Bulletin* 1941 Vol 38 p 328 who finds some correlation between the amount of envelope substance and virulence and protective power]. WATTS *et al* (p 827) have studied envelope material and while they consider that the soluble substance (envelope material) obtained from washings of growth is not dependent on the production of smooth or rough colonies, yet a rough strain tends to be poor in this soluble substance. They state, however, that there

is no relation between this soluble substance and virulence but that the titre of the substance seems to indicate the antigenic value of a strain.

WATS & PUDUVAL (p. 827) have obtained two types of colony on blood agar one smooth and translucent from a virulent strain the other rough and irregular from an avirulent strain. There were no differences in carbohydrate and protein reactions, but in broth the smooth strain gave uniform turbidity and the rough gave a granular deposit.

RAO (p. 825) has measured the oxidative activity of *P. pestis* in culture towards hexoses, pentoses, organic acids and amino acids, finding the activity to be in that order i.e. the highest towards the hexoses. This activity is closely correlated with fermentation activity. Glucose and lactose are the best and cheapest sources of carbon for media. The useful amino acids are named. Russo (p. 422) has studied the fermentation reactions of *P. pestis* especially those of freshly isolated strains, which differ in some respects from those of stock laboratory cultures. Details are given.

WATS *et al* (p. 420) have found certain serological differences between *P. pestis* grown at 25°C. and those cultivated at 37°C. With bacilli grown at 25°C. agglutination by specific serum was slow the flakes were small and the sediment compact. With bacilli grown at 37°C. agglutination was rapid, the flakes were large and the sediment voluminous. The 37°C. growth absorbs all agglutinins from sera obtained by immunizing animals with either 37° or 25° growths, but the 25° growth will only absorb its own agglutinins. The 37° growth, when heated at 100°C. for one hour behaves like the 25° growth. The method of immunizing animals with these growths, for which the technique is not simple, is described.

GIRARD (p. 422) does not consider that the production of nitrite in liver bouillon is enough to distinguish *P. pestis* from other organisms. He regards the rhamnose test as much more absolute, stating that *P. pestis* does not ferment rhamnose, whereas *P. pseudotuberculosis* does [but Russo (above) states that most of his freshly isolated strains of *P. pestis* fermented rhamnose].

SAVINO *et al* (p. 422) have isolated Pasteurella organisms from bone marrow cultures of rats in the Argentine. These were not *P. pestis* and it is therefore concluded that it is not safe to diagnose plague in rats without putting the organism isolated to a complete cultural test for *P. pestis*.

Clinical Findings and Treatment

LEWILLOX *et al* (p. 828) describe a case of apparently primary plague meningitis.

SOKHEV and DILSHIT (p. 828) quote experiments with mice which indicate that sulphathiazole is much superior to sulphapyridine in treatment both before and after the septicaemic state has set in. Even in septicaemia a dose of 40 mgm. sulphathiazole given twice daily for 10 days cures 80-90 per cent. of the animals. As plague is much more severe in the mouse than in man there seems to be a prospect of a great advance in therapy by means of this compound. Sulphanilamide therapy is referred to by VAN HOOFF (p. 419). MOREAU (p. 829) reports recovery in two patients with bubonic plague treated by E.V. serum and the sulphonamide preparation Bacteramide.

Control

ROSIER (p 425) refers to the house improvement scheme in Java which is one of the principal anti plague measures. In 1938 56,265 houses were remodelled, bringing the total to 1,525 364 and 54 548 new houses were built on approved anti-plague lines. SOERONO (p 426) also writes of this house improvement scheme describing the progress made in the Madja district of Java. This is a wealthy area and materials such as wood, bamboo and tiles are readily available. No compulsion was used other than strenuous propaganda but it is noted that inspection and condemnation of houses isolation of contacts and spleen puncture in suspected cases after death were unpopular. There were 8 070 houses due for improvement and although the voluntary system was employed all except 0.38 per cent of these had been remodelled within 4 years. The only financial inducement given was a bonus of three florins for each completely reconditioned house. This great success of the voluntary system which has been followed by the complete elimination of plague, is encouraging though it is realized that progress cannot always be so good.

SOKHEY *et al* (p 427) state that rat proofing of dwellings and the building of suitable grain godowns is not economically possible in India poisoning and trapping of rats are not very successful, and the usual methods of dealing with fleas are even less so. Fumigation with HCN is effective but dangerous but fumigation with the new proprietary cyanide compounds is now a practicable measure. Calcid briquettes are eminently satisfactory for fumigation. AHLUWALIA (p 830) points out that cyanide preparations are particularly useful because they kill not only rats but also fleas. Fumigants such as carbon monoxide or sulphur dioxide are less effective or less convenient. He has compared the efficiencies of Calcid and Cyanogas and reports in favour of the former. With proper control and under trained supervision he thinks that there is no danger in the use of Calcid in inhabited areas.

PARANJOTHY (p 831) reports that in herd experiments with strains of *Salmonella* and *Pasteurella* and with *Ectromelia* these organisms failed to precipitate epidemics in rat populations. They therefore appear to be ineffective anti rat agents. He discusses the diseases carried by rats and has investigated certain commercial viruses and chemical poisons. YOKOYAMA (p 427) has studied the infectivity of certain strains of *Salmonella* for ground squirrels and rats in Manchuria. PARANJOTHY (p 831) reports on experiments with bacterial exotoxins, which proved to be of little value as rat poisons and on various chemical poisons used in the Department of Agriculture. DANKEL (p 427) claims that Red Scilla (*Urginea scilla*) is lethal to the rat and the rat alone. The active principle is presumably a glucoside. In the report of the plague campaign in Hawaii (p 830) are given instructions for the preparation of banana phosphorus bait.

SÁENZ (p 423) argues that if the guinea pig rodents of Riobamba Ecuador are the main cause of epidemic outbreaks of plague there is no other remedy than complete extermination. In the province of Loja however this author (p 824) states that it would be almost impossible to exterminate the culs which are the sylvatic reservoirs.

JUNIOR (p 832) discusses the work of the plague laboratory in São Paulo

MANSOY BAKER and WALTON (p. 382) describe a woman in England from whose common bile duct *Fasciola hepatica* was removed at operation. There were no eggs in the faeces and no eosinophilia. STIGLICH (p. 383) reports four cases of infection with *F. hepatica* in Peru. Eggs were found in the faeces of only one but were disclosed by duodenal sound in all. Emetine was useful in treatment.

SANDGROUXD and BOVE (p. 383) report that tetrachlorethylene is rapidly effective in the treatment of infection with *Echinostomus lindensis* [sic but *lindoense* would appear to be grammatical] and describe morphological characters of the worm. Development takes place in the planorbid *latus* (*Gyramalus*) *serasinorum* and metacercariae are found in other snails and mussels, the latter of which are part of the regular diet of the natives. LARIOS RODRIGUEZ (p. 383) reports five infections of man with *Echinostomus revolutum* in Mexico. In all the diagnosis was parasitic colitis with abdominal pain, diarrhoea and eosinophilia, and eggs were found in the stools. The intermediate hosts are *Lymnaea attenuata*, *Physa osculans* and *Planorbis tenuis*. BEAVER (p. 384) describes investigations on the life history of the echinostome *Emparyphium melis* the cercaria of which encysts in tadpoles and of which the snail *Stagnicola emarginata angulata* is an intermediate host. Adults have been found in the mink and other animals and HSU (p. 384) reports that he has found two of the flukes in a man in Peiping. C II

MAPLESTONE (P. A.) & BRADURI (N. V.) The Helminth Parasites of Dogs in Calcutta and their Bearing on Human Parasitology — *Indian Jl Med Res* 1940. Oct. Vol. 28 No. 2 pp 580-604 [27 refs.]

"1 Twenty-one different helminth parasites have been recovered from the 200 dogs examined by us. The complete list of worms found in dogs in India includes 50 species and of these 10 are now recorded by us in this paper for the first time.

"2 One of them *T. colubriformis*, which is a common parasite of herbivora and occasionally of man, has never before been found in a carnivore.

"3 No member of the genus *Paramphistomum* or of the family *Tregiotrematidae* has ever before been recorded in dogs and *P. sufragryfer* whose known distribution is limited to North-Eastern India, has hitherto been found in pigs several times and in man twice.

"4 The two flukes *H. heterophyes* and *O. felinus* are common parasites of man in other parts of the world, so they are important potential parasites of man in India. As both these worms depend on eating of raw fish for their transmission, the Indian is protected from acquiring them by the fact that he rarely indulges in this form of diet. The same set of circumstances also limits the incidence of *G. spinigerum* infection in human beings in India.

"5. By far the most important parasite of the dog in Calcutta as a menace to the health of man is *E. granulosus* the incidence of which is fairly high for city dogs.

"6. The absence of *T. ovis* from all our dogs, coupled with our failure to identify *C. ovis* in mutton sold in Calcutta, disposes of our previously held opinion that this tapeworm was a possible source of

at least some of the cases of human cysticercosis of which an unduly large number has been seen in British troops in India during the past few years.

CHANG (K.) & LIN (C. C.) *Intestinal Parasite Infections of Man in Chengtu and its Vicinity*—*Chinese Med J* 1940 Nov Vol. 58 No 5 pp 570-581 With 1 map [13 refs]

By means of two faecal smears one in normal saline and one in iodine 2,896 persons were examined. They were in four categories namely 1,578 hospital patients mostly out-patients at the United University Hospital 1,011 school-children 241 soldiers and 66 inmates of a home for the aged all in or near Chengtu.

A table gives the discovered incidences of seven protozoal and 11 helminthic infections. Among the latter *Ascaris* was by far the commonest the percentage figures for the four groups being 36.76 82.49 68.89 and 57.58 hookworms were found in only one child, though the percentage in soldiers was 34.02 *Trichuris* was highest (19.7) in the aged. The rarer helminthic infections discovered were—*Strongyloides* one in a patient *Toxocara canis* one in a child *C. sinensis* three in patients and four in soldiers *F. buskii* 10 in patients *S. japonicum* two in patients *T. saginata* one in a patient, both oncospheres and proglottids being seen *Taenia* of unidentified species, four in patients.

In more detail the soldiers had mostly been farmers before going into the army and had often gone barefoot or in straw sandals facts falling in with their high hookworm incidence for *Ascaris* another table shows reports of its incidence by various workers in China. *Clonorchis* seems hitherto not to have been reported from man in Szechuan Province though present in 35 per cent of cats as the Provincial Bureau reports. Only one of the *F. buskii* hosts had even been outside the Province. One of the patients harbouring *S. japonicum* reported that persons with similar symptoms lived near him just outside Shwangliu city and a local survey of *Oncomelania* snails is being undertaken. It is believed that *A. lumbricoides* and *E. histolytica* have quite distinct modes of transmission in West China.

Clayton Lane

YOUNG (Martin D.) & HAM (Coyt) *The Incidence of Intestinal Parasites in a Selected Group at a Mental Hospital*.—*Jl Parasitology* 1941 Feb Vol. 27 No 1 pp 71-74

These infections were found in the faeces of 142 mental patients in South Carolina. Examinations were of material in simple saline and saline iodine. Percentages were Parasites of all kinds 90 helminths 92, made up of *Strongyloides* 39 hookworm 66 *Trichuris* 78 *Ascaris* 10 protozoa 65 including *Balantidium* 5 C L

MEIRA (João Alves) & AMARAL (A. Dacio F.) *Considerações sobre disseminação helmíntica entre operários com especial referência aos casos positivos para *S. stercoralis* e *S. mansoni** [Incidence of Helminths among Labourers, especially of *Strongyloides stercoralis* and *Schistosoma mansoni*].—Reprinted from *Rev Biol e Hig São Paulo* 1940 June Vol. 10 No 2 pp 119-133. [13 refs]

The results of faecal examinations on labourers at São Caetano Brazil.

regions over 80 per cent of the males above 10 years of age are infected, while the proportion of females infected is usually slightly lower. Virtual elimination of the infection through snail control seems a definite possibility, requiring only money and perseverance." [See also this *Bulletin*, 1940 Vol 37 p 484]

MEXIA (João Alves) Sobre a reação de Takata na esquistosomíase mansônica. [Takata Reaction in Mansonian Schistosomiasis].—Reprinted from *Rev de Med São Paulo* 1940 Sept. Vol. 24 No 81 pp. 44-60 With 3 figs [17 refs.] English summary

Probably the Takata reaction will prove of little clinical significance in Mansonian schistosomiasis

The study is of 23 patients. In two of them a piece of liver removed during a splenectomy showed marked cirrhosis and the reaction was positive in one and negative in the other. In eight of them the reaction was negative before antihomaline treatment began afterwards it remained so in seven but became positive in one. In two in whom the reaction was positive the albumin-globulin ratio in the serum was studied albumin was lessened and the normal ratio might be reversed

C L

JAXER (José L.) Miracidial Twinning in *Schistosoma mansoni* [Research Notes].—*Jl Parasitology* 1941 Feb Vol 27 No 1 p 93

A Siamese twin formed by two miracidia joined together for the anterior two-thirds of their length and lying within an eggshell of normal size

C L.

CAWSTON (F Gordon) Characteristics of the Freshwater Mollusc found in Southern Rhodesia and the Union of South Africa and Popularly Known as *Physopsis africana* Krauss.—*Jl Trop Med & Hyg* 1940 Nov 15 Vol 43 No 22 pp 262-264 With 1 fig [10 refs.]

BRACKETT (Sterling) Pathology of Schistosome Dermatitis.—*Arch. Dermat & Syph* 1940 Sept Vol 42, No 3 pp 410-418. With 3 figs

The skin of the inner aspect of the forearm was deliberately infected with *Cercaria chas* and *C. stagnicolae* affected parts were excised after an interval, were fixed, and were serially sectioned and stained with haematoxylin and eosin

The area excised 50 hours after infection with *C. chas* measured 2.5 by 1 cm that excised 29 hours after infection with *C. stagnicolae* was near the last but about twice its size. No cercariae were found in the tissues in either but in both there were burrows in the epithelium and evidence of acute inflammation. As to the 29-hour-old lesions—

These burrows were traced from section to section and in several cases from a point where they entered on the surface to a place where they ended blindly still within the malpighian layer. No evidence was seen which indicated that the cercariae had gone beyond this layer into the deeper tissues. For the most part the lesions were almost completely filled with neutrophils, which in places formed intraepithelial abscesses. Generalized edema in the vicinity of the burrows and in the cutis and the subcutaneous tissue below them was pronounced. Lymph vessels were

dilated and easily seen. In the 56 hours old lesions The burrows were still confined to the epithelial layer and in following some of them from section to section there was seen no evidence that the cercariae had penetrated into the deeper tissues. The channels were filled in places with loosely arranged debris and with some recognizable neutrophils and lymphocytes. In other places the burrows were completely empty or showed evidence of having contained a more or less clear fluid. Above some of the burrows were edematous infiltrations between the malpighian layer and the cornified tissue. The acute inflammatory reaction seemed to have subsided considerably but, in contrast to the picture in the earlier sections a striking invasion of eosinophils had occurred. The latter cells were present in large numbers in the subcutaneous and dermal tissues and formed a large percentage of the cells that could be identified within the lumens of the burrows and in the superficial edematous patches. I have been exposed to schistosome cercariae both experimentally, and naturally many times each summer since about 1934 and each year my reaction has been increasingly pronounced. At the outset the lesions were mild and caused little trouble but by the time the biopsies were made in 1938 and 1939 penetrating cercariae would cause an almost immediate urticarial response. Within half an hour the area of penetration would be swollen, and often within 12 hours inflamed lymph vessels could be traced for more than half the length of the forearm.

It is pointed out that some people show no reaction after contact with these cercariae probably it is suggested, because they do not enter the skin

C L

BRACKETT (Sterling) Studies on Schistosome Dermatitis. VIII Notes on the Biology of the Snail Hosts of Schistosome Cercariae in Wisconsin and Epidemiological Evidence for the Life Cycles of Some Avian Schistosomes.—*Amer J Hyg* 1940 Nov. Vol. 32. No 3 Sect D pp 85-104 [21 refs.]

The cercariae dealt with are *Cercaria stagnicola* and *C. physellae* whose respective intermediate hosts are *Stagnicola emarginata* and *Physa parkeri*. The biology of these snails is here correlated with the seasonal prevalence of swimmer's itch.

The life span of these snails is never much more than a year the adults usually die soon after breeding and the young hatch about the same time so that after the death of the adults all snails are of about the same age. When the itch is caused by penetration of *C. stagnicola* the adult snails from which they have emerged (*S. emarginata*) die about August and swimmer's itch then begins to disappear when it is by *Ph. parkeri* it ceases earlier for the snails die earlier in the year. Evidence suggests that *C. physellae* is the larval stage of *Pseudobikermella querquedulae* of the blue-winged teal.

C L

CORT (W W) McMULLEN (D B) OLIVIER (Louis) & BRACKETT (Sterling) Studies on Schistosome Dermatitis. VII Seasonal Incidence of *Cercaria stagnicola* Talbot, 1936, in Relation to the Life Cycle of its Snail Host, *Stagnicola emarginata angulata* (Sowerby).—*Amer J Hyg* 1940 Sept Vol. 32. No. 2. Sect. D pp 33-60 With 1 map & 8 graphs. [22 refs.]

This covers in detail much of the other paper with this practical point —

The great increase in the prevalence of schistosome dermatitis in the last 10 years in northern Michigan is probably due to the increase in the use

of the beaches for bathing purposes rather than to any increase in infection of the snails with the schistosome cercaria. Without active control measures it seems certain that the incidence of this dermatitis will continue to increase with the increase of the summer tourist business which will lead to a constant development of new beaches for swimming purposes."

C. L.

Hsü (H. F.) & Li (S. Y.) Studies on Certain Problems of *Clonorchis sinensis*. VIII. Experimental Proof of *Bithynia longicornis* as the First Intermediate Host of *C. sinensis*.—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 241-243.

The evidence given is that 200 *Bithynia longicornis* collected near Peiping were fed on *Clonorchis* eggs washed from the gall bladder of a cat. They developed cercariae with the morphology of those of *Clonorchis sinensis*. Into an aquarium were put 180 of these snails and certain laboratory bred *Pseudorasbora parva* and the latter developed cysts identical with those of *C. sinensis*. The flesh from these infected fish was given to laboratory bred cat and guinea pig, and the adult flukes were found in the bile tracts of both animals. *B. longicornis* is abundant in the fish ponds in the Canton area, which is an endemic centre of clonorchiasis.

C. L.

Hsü (H. F.) & Li (S. Y.) Studies on Certain Problems of *Clonorchis sinensis*. IX. The Migration Route of its Early Larval Stages in the Snail, *Bithynia fuchsiana*.—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 244-254. With 38 figs. on 10 plates.

When *B. fuchsiana* swallows *Clonorchis* eggs, the miracidia hatch out either in rectum or intestine become sporocysts in the wall of the organ concerned, and the sporocysts migrate into surrounding lymph spaces, or into those surrounding stomach, oesophagus or even liver. There they produce rediae which migrate into these spaces within the liver and other parts including foot and mantle.

C. L.

Cuo (H. J.) Studies on *Clonorchis sinensis* in Vitro. Part III. Survival Period in Relation to Certain Dyes.—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 255-259.

When trypan blue, methyl green or acid fuchsin in the strengths shown below were added to the medium in which *C. sinensis* was kept *in vitro* the life of the flukes was lengthened.

In methyl green solution, 1 in 5,000, the flukes lived up to 135 days, in trypan blue solution, 1 in 2,500 up to 51 days, in acid fuchsin the lengthening of life was slight. A weak solution is not so effective in prolonging life.

C. L.

Cuo (H. J.) & Hsü (Chen-hang) Studies on *Clonorchis sinensis* in Vitro. Part IV. Combined Effect of Gentian Violet and X Rays.—*Chinese Med. Jl.* 1940. Mar. Supp. 3. pp. 260-266.

A combination of very weak gentian violet with comparatively low X-ray dosage shortened the life of *Clonorchis in vitro*.

C. L.

TANG (C. C.) A Comparative Study of Two Types of *Paragonimus* occurring in Fukien, South China.—*Chinese Med J* 1940 Mar Supp 3 pp 267-291 With 23 figs. on 6 plates. [27 refs.]

Two types of *Paragonimus* are it is believed present in the Fukien Province, their distribution overlapping in the Foochow Futsung region. They are designated the *ringers* type and the rodent type.

The *ringers* type redia averages about twice as big as that of the rodent type namely length of 1.21 mm as compared to 0.56 mm and breadth of 0.35 compared to 0.15 the method of preparation being the same in each group. The cercaria of the rodent type has long spines on the postero-lateral parts of the body that of the *ringers* type has not. The metacercaria of the *ringers* type in crabs has a very thick cyst wall averaging 0.014 mm. in depth, that of the rodent type is membranous. Perhaps these mean specific differences. Of the *ringers* type the first larval host in Fukien is *Melania toucheana* and the second *Potamon (P) denticulatus*. The corresponding animals in the rodent type are *Kalajayana tangi* and *Parathelphusa (P) sinensis*. The need is urged for investigation of such differences in India and the Philippines.

C. L.

CHEN (H. T.) Morphological and Developmental Studies of *Paragonimus sloktsuenensis* with Some Remarks on Other Species of the Genus (Trematoda: Troglotremaidae).—*Lingnan Sci J* 1940 Oct 26 Vol. 19 No 4 pp 429-530 With 134 figs. 1 chart & 14 plates [61 refs.]

The present work covers a detailed study of the morphology of the adult of *Paragonimus sloktsuenensis* Chen its life history and its comparison with certain species of the genus of which material is on hand. The parasite so far is found naturally only in rats.

A detailed historical account of the occurrence of the genus in China from the aspect of geographical distribution is given. The review shows that detailed life history is known only to this species in this country.

Morphological studies of the adult indicate that the present species is very similar to other species except for cuticular spines. The latter are variable in shape but are typically elongated, broad at base and tapering gradually to the tip. The base may be square or rounded, or may be occasionally divided lengthwise. The tip may be pointed bluntly, pointed or bluntly pointed with serrated edge or as broad as or broader than the base or broad with serrated edges. In arrangement the spines may be in rows or in clusters or occasionally singly spaced. The spines on the ventral side between the two suckers are in groups of two (rarely one) to as many as five or six with two to four being the commonest and on the ventral side between the two testes in groups of from two to about ten with five or six being the commonest.

Other adult structures which appear to have diagnostic values are the more delicate branchings of the ovary, the more slender central mass of the testes, the larger size of the seminal receptacle and the curved manner of the seminal vesicle.

The metacercaria is an oval body with one wall only. It is very thin and easily broken. This distinguishes the present species from

all other members of which the life histories are known. Definite differences are also encountered in eggs and second generation rediae. Little can be said regarding other stages until more data from other species are available.

"Based on experimental feedings it has been found that *P. ilok truenensis* cannot infect wild cats, pigs, gumbags and monkeys. When compared with known records it indicates that host specificity may be an important factor in distinguishing this species from others.

"By basing on the habitat of the intermediate hosts of various species of *Paragonimus* it is possible to divide the species of which the life history is known into plain breeders and hill breeders. Of the former *P. ilok truenensis* is a representative and of the latter *P. westerni*.

"As a result of the present studies it may be tentatively concluded that *P. westerni*, *P. kellicotti*, *P. ohirai* and the present species are valid species. The status of *P. romboicus* requires further investigation as no material is available for comparison although it appears to be a good species on the basis of Lever's description.

SANDGROUND (J. H.) *Plagiorchis javensis* n. sp. A New Trematode Parasite in Man.—*Rev. Med. Trop. & Parasit.* Habana 1940. July-Aug. Vol. 8, No. 4, pp. 207-211. With 1 fig.

The third reported instance of a *Plagiorchis* species parasitizing man. The first record was by AFRICA and GARCIA [*Papers on Helminthology. 30th Jubileum of the Activities of A. J. Skryabin*, Moscow, p. 8] who found five specimens in the small intestine of a native of the Province Ilocos Sur, Philippines; the second was when McMULLIN (*Jl. Parasitology*, 1937, Vol. 23, p. 113) deliberately infected himself and various local birds, and identified the flukes as *P. muris* Tanabe, 1922. This third instance came to light while the contents of the small intestine of a Javanese were being sieved in the Pathological Institute at Batavia. One worm only was found there. It measured under 2 mm. long and under 1 mm. wide and looked like a small fleshy barley grain. It is described and illustrated and will be deposited in the Helminthological Collection of the U. S. National Museum, Washington. The worms that Africa and Garcia left unnamed to avoid the unnecessary multiplication of doubtful species, Sandground names *P. philippinensis* holding that to name a parasite eases indexing and helps later workers. C. L.

MAXON BAKER (Philip) & WALTON (James). The Surgical Removal of *Fasciola hepatica* from the Common Bile Duct with a Commentary upon this Infection in Man.—*Brit. Jl. Surgery*, 1941, Jan. Vol. 29, No. 111, pp. 380-383. [14 refs.]

F. hepatica was removed from the bile duct of a woman of 54. She had never been outside the British Isles, was fond of watercress, and chewing grass when on a country walk. At 18 years old she had a tapeworm, at 29 biliary colic with passage of gallstones; at 39 the colic returned, at 46 she had it again and the gall-bladder was removed and had small calculi in its wall but none in its lumen. At 53, after reappearance of the pain, pancreatitis was suspected and on laparotomy the common bile duct was found dilated, was opened, and the parasite was disclosed and removed. It measured 23 by 13 mm. It is noted

that outside the liver there were no evidences of infection—no eggs in the faeces and no marked eosinophilia—and it is pointed out that among obscure cases of hepatic disease, other such infections may have been missed and that it seems to be the second instance in which removal of this parasite from the bile duct of man has been reported

C L

STIGLICH (Germán) *Distomatosis hepática*.—*Rev Méd Peruana* 1940 Sept Vol. 12. No 141 pp 311-322.

A description from Lima Peru of four cases of infection with *Fasciola hepatica*

Epigastric colic and icteric tinge over the sclera were present the eggs of the parasite disclosed by the duodenal sound in all but found in the faeces in one only though *E histolytica* was present in three and hookworm eggs in one while in one there was eosinophilia up to 25 per cent Emetine hydrochloride was valuable in treatment C L

SANDGROUND (J H) & BOYNE (C) *Echinostoma lindoesis* N Sp., a New Parasite of Man in the Celebes with an Account of its Life History and Epidemiology.—*Amer J Trop Med* 1940 July Vol. 20 No 4 pp 511-535 With 2 plates. [13 refs]

So far as it adds to the authors earlier paper [this *Bulletin* 1940 Vol. 37 p 491] their summary of this one runs thus —

The parasites are rapidly expelled by tetrachlorethylene medication and as many as 250 worms have been recovered after a single treatment. The species is characterized by the possession of 37 collar spines in this respect it resembles *Echinostoma revolutum* Froelich more than it does any other member of the Echinostomidae recorded from man. While the morphological features whereby the marita stage may be distinguished from that of *E revolutum* are not striking, it appears that more tangible differences may be recognized in the redia and cercaria stages At Lake Lindoe larval development was found in natural infections of a small planorbis, *Axius* (*Gyraulus*) *sarasinorum* the metacercaria was found in several pulmonate snails e.g. *Viviparus javanicus rudipellis* and also in the mussel *Corbicula lindoesis* Boll which occurs in large numbers in certain parts of the lake These mussels form a regular part of the diet and the echinostome infection rates in the 3 villages are proportionate to the distances that the villagers have to travel to procure mussels for the pot and by the same token to pollute the lake so as to bring about infection of the mussels.

Infection of man with the production of the characteristic worms followed the ingestion of mussels. Rats and mice have also been experimentally infected but the worms do not grow as large as they do in man and the worms are spontaneously expelled a few weeks after attaining maturity

LARIOS RODRIGUEZ (Ignacio) *Echinostoma revolutum* (Froelich 1802) (Trematoda Echinostomidae) estudiado por primera vez en México como parásito del hombre [Thesis.] [*E revolutum* studied for the First Time in Mexico as a Parasite of Man.].—82 pp. With 40 figs. [17 refs] 1940 Mexico D F

A general consideration of *E revolutum* and a description of five infections in man one of them experimental.

In all the diagnosis was parasitic colitis eggs having been found in the stools with, in the natural infections *Ascaris* twice, *Enterobius*

tence, *H. nana* and *T. solium* once both in the same patient. Hexyl-resorcinol was effective in unworming. The experimental infection was in a medical student, aged 22, who swallowed 20 cysts in a capsule, and 11 days later had intense abdominal pain lasting for 24 hours, and diarrhoea with pale yellow stools containing some scybala, and an eosinophilia of 15.5 per cent. In the natural infections this ran as high as 24 per cent with haemoglobin down to 70 per cent. The intermediate hosts—*Limnaea attenuata*, *Physa osculans* and *Planorbis* *terrestris*—are described and pictured and experimental infections have been obtained in duck and pigeon by feeding cysts from the hepatopancreas of these snails and it is evidently these that were used for the human infection. C. L.

- i. BEAVER (Paul C.) Studies on the Life History of *Euparyphium melis* (Trematoda: Echinostomidae).—*Jl Parasitology* 1941 Feb Vol 27 No 1 pp 35-44 With 13 figs. on 1 plate 12 refs.

- ii. Hsi (H. F.) *Euparyphium jassynense* Leon and Cures (= *E. melis* (Schrunk)) found at the Autopsy of a Chinese.—*Chinese Med Jl* 1940 Nov Vol 58 No 5 pp 552-555 With 3 figs. on 1 plate.

i. An echinostome cercaria was found in 1 of 133 adult *Stagnicola marginata angulata* which seemed to be identical with *Euparyphium melis* (Schrunk, 1788). Next year 1 of 550 of these snails was found infected with the same parasite of which the redia, cercaria, metacercaria and adult are now described.

When the cercariae are placed in a vessel with tadpoles they rapidly enter the cloacae of these. In three weeks they are probably infective. A ferret was fed on 5 tadpoles, representing about 100 metacercariae. 28 to 37 days old got diarrhoea and was killed on the eleventh day in case the illness should expel adult parasites. High up in its duodenum one fluke was found and in its stomach a quantity of toweling of which it had eaten 30 square inches and which perhaps caused its upset. No note on the ferret's antecedents has been found in the paper. Though the fluke's immature structure sufficed for post-mortem identification and it and an average sized specimen from a duck are fully pictured.

ii. At autopsy two trematodes were found in the small intestine of a Chinese male who had died in the Peking Medical College Hospital of chronic myelogenous leukaemia. They are described and are identified in the terms set out in the title. But SZIDAT (1940) has recently pointed out that *E. jassynense* as described by LEON and CUREA (see this Bulletin 1922, Vol 19 p 651, is identical with *E. melis* of badgers, hedgehogs and other mammals in Europe and of dogs in Japan; moreover one of Hsi's two specimens happens to agree with the outstretched specimens of *E. melis* described by SZIDAT, and the other with *E. jassynense* as figured by LEON and CUREA, so the latter name becomes a synonym of the former (and lapses under the Code of Zoological Nomenclature). The patient had left Peking for Jehol, but a few months later started back and being too poor for other means of travel walked back. This took four months during which he

weakened for he suffered from dysentery and ate irregularly and he died six days after entering hospital. It is suggested that he may have swallowed tadpoles on his journey

C. L.

SPRUE

PRECIS OF ABSTRACTS IN THIS SECTION

MANSON BAHR (p. 386) writes of the value of nicotinic acid in the treatment of the glossitis of pellagra and sprue and of riboflavin in angular stomatitis. The glossitis of pernicious anaemia also responds to nicotinic acid and the author refers to other points of similarity between this disease and sprue idiopathic steatorrhoea and pellagra. He then reports a series of cases of sprue treated with nicotinic acid, noting its curative effect not only on the glossitis, but also on the gastrointestinal symptoms and the skin. For haemopoiesis liver therapy is necessary. The author distinguishes between non tropical sprue and idiopathic steatorrhoea the former is the analogue in temperate climates, of tropical sprue. TACOSZ (p. 388) describes a case of early sprue in which there were symptoms resembling those of pellagra. Treatment with nicotinic acid and a liver preparation produced improvement.

DE LANGEN (p. 388) found that the flat curves of blood fat and blood sugar in sprue were improved after the administration of liver extract especially the impure preparations.

HANES and REISER (p. 389) discuss the relation of phosphorus to fat and glucose metabolism in sprue. The observed delayed fall in serum phosphorus after glucose ingestion indicates that the sugar reaches the blood stream slowly and is there as slowly absorbed. The findings indicate the slow rate of intestinal absorption in sprue. ERF and RHOADS (p. 389) quote investigations which suggest that in sprue and pernicious anaemia glycine is more slowly absorbed than in normal persons from the gastrointestinal tract. After the administration of liver extract this abnormality was not found. CHITRE and PAT WARDHAN (p. 390) have studied the absorption of calcium from the duodenum of anaesthetized dogs.

MACKIE and MILLS (p. 390) describe changes in the X ray appearances of the small intestine in sprue idiopathic steatorrhoea and chronic ulcerative colitis with deficiency disease.

MARKOFF (p. 391) discusses the aetiology of non tropical sprue and describes the case of a patient in whom the condition developed after resection of 1.5 metres of small intestine. He considers that local inflammatory changes in the ileum may lead to sprue symptoms and that mild gastroenteritis may be the starting point. Non tropical sprue is a clinical syndrome and the main location of the disease process is the whole length of the small intestine.

ALLEN (p. 392) reports a case of non tropical sprue in which there was a tendency towards severe haemorrhage which was to some

extent remedied by administration of vitamin K. There is probably in sprue, a defective absorption of the vitamin which leads to deficiency of prothrombin in the plasma.

CHILDS and DICK (p. 393) record a case of non-tropical sprue in which the administration of pancreatic juice brought about a more definite improvement in the stools than did liver extract alone. The findings recorded by the authors suggest that there is a deficiency in some as yet undemonstrated pancreatic factor. The use of dried pancreatic substance apparently caused improvement in the appetite and in the blood condition.

Q SULLIVAN (p. 394) describes two cases of idiopathic steatorrhea in adults. In comment MOORE remarks that the fundamental fault is usually imperfect absorption from the small intestine, especially of lipoid material resulting from chronic jejuno-ileal insufficiency.

C IV

MANSON BARR (Philip). The Treatment of Sprue with Vitamin B₁ and its Bearing upon the Aetiology of this Disease.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941 Mar 27 Vol 34 No 5 pp. 347-372 With 1 chart [117 refs.]

The introductory portion of this paper is concerned with a recapitulation of views previously expressed [See this Bulletin 1941 Vol 33 p. 7]. The action of nicotinic acid upon pellagra, glossitis and the allied glossitis of sprue suggests that these two conditions are closely allied. The special action of riboflavin appears to be to beal the excoriations or the angular stomatitis which are frequently associated with sprue as well as with pellagra. This therapeutic effect indicates that pellagra stomatitis is due to a vitamin I deficiency and this may also be responsible for the conditions described by WILLIAMS, GILLAN, and TROWELL as pellagroid. Attention is drawn to the resemblance between these and the state generally recognized in general medicine as the Plummer Vinson syndrome which is also characterized by glossitis.

The relationship between sprue and pernicious anaemia is next discussed. There appears to be some indication that the glossitis of this anaemia is closely allied to if not identical with that of sprue, and responds to nicotinic acid therapy. The differential diagnosis is not always easily established—the achlorhydria and hypochlorhydria which characterize pernicious anaemia do not always furnish a reliable index because they are not uncommon in sprue. A table illustrates this point in which it is shown that achylia, achlorhydria, normal acid curve and hyperchlorhydria have been noted in sprue. There appears to be no connexion between the constitution of the gastric juice, glossitis, degree of anaemia, haemoglobin, blood calcium and essential progress of the disease. Therefore in sprue the acidity of the gastric juice cannot be correlated with absence of the intrinsic factor. A significant feature pointed out by JACOBSON is that anti-anaemic activity of the alimentary canal corresponds with the distribution of argentaffine cells. In pernicious anaemia they are absent and are said to be deficient also in sprue.

The geographical distribution of pernicious anaemia in relation to that of tropical sprue deserves some consideration. The facts appear to be that the former is extremely rare if not entirely absent in tropical native races. It may well be that pernicious anaemia, like

sprue itself Cooley's anaemia and sickle-cell anaemia may exhibit a distinct racial incidence for sprue is also very seldom seen in pigmented native races

A table of differential diagnosis illustrates the main points between pernicious anaemia, tropical sprue, idiopathic steatorrhoea and pellagra wherein it is emphasized that the third named is like pernicious anaemia, mostly a disease of the northern hemisphere. In the clinical pathology and associated anaemia there are many points of resemblance between these various clinical states.

The main portion of the paper is devoted to the treatment of sprue with nicotinic acid. A series of 24 well marked cases has been given therapeutic doses of nicotinic acid and 7 have received riboflavin in addition. The results are summarized in a table which sets forth the effect of nicotinic acid on sprue glossitis part of which is the rapid return of taste-sense. It is claimed that the subsidence of these irritating symptoms exerts a profound influence upon digestion and assimilation. The fiery redness of the tongue in advanced sprue tends to fade under nicotinic acid therapy within 24 hours and its appearance is restored to normal within four days. In the glossitis of advanced sprue with marginal indentations and angular stomatitis the addition of riboflavin appears to be necessary. The dosage of nicotinic acid ranged in different cases from 150-300 mgm. a day and that of riboflavin was about 3 mgm. Probably further experience will suggest that larger doses than these are advisable.

The effect of the treatment upon the gastro-intestinal tract has been less easy to gauge. Usually diarrhoea ceases within 4 days and the stools become normal in size and colour within a period of 2-3 weeks. It has been possible under this treatment to permit a greater range and variety of diet than was formerly considered advisable all have been able to resume active life and occupation. In one of the most advanced cases with very severe anaemia the patient returned to Ceylon and remained well. Flatulence and meteorism were strikingly absent from the series a table is given of details. It is emphasized that nicotinic acid therapy must be prolonged for three and intermittently thereafter for six months.

It is not claimed that vitamin B₂ treatment exerts any influence upon haemopoiesis and consequently it is necessary to persist with intensive parenteral liver therapy. Nicotinic acid has an effect upon the skin of advanced sprue a rapid improvement takes place in appearance and texture coincident with increase in body weight. It is too early yet to assess the value of this treatment in preventing future relapses. The specificity of nicotinic acid treatment can be used in the recognition of allied states, such a one is non-tropical sprue which was well described by THAYSEN in 1932 and should be regarded as the analogue of tropical sprue in northern countries—distinct from idiopathic steatorrhoea and coeliac disease. Such a case was detailed by the reviewer in 1929 [see this *Bulletin* 1930 Vol. 27 p. 346] and now two further examples are described, which have originated in London and in which response to nicotinic acid therapy has been as marked as in the classical disease. In the second case the increase in weight whilst maintaining the same dietary is illustrated by a graph.

It is concluded that on the analogy with pellagra in which the typical uncomplicated disease is mainly tropical or subtropical in distribution on account of dietetic reasons, it is possible to postulate

that, though the sprue syndrome is commonly met with in its most highly developed form in tropical residents, yet manifestations of the same process may be encountered elsewhere where it is recognized as non-tropical sprue

P. Manson-Bahr

TECOX (R. M.) Stéatorrhée (genre sprue) avec symptômes pellagroïdes. [Sprue-like Steatorrhea with Pellagroid Symptoms.]—*Rev Méd Suisse Romande* 1940 Nov 25. Vol. 60 No 13 pp. 1040-1044 With 2 figs.

A plasterer aged 43 came to hospital on account of digestive troubles diarrhoea and frequent vomiting. He was observed to present a reddish-brown pigmentation of face, neck and fore-arms, unexposed parts not being affected. The skin of the hands was thickened, hard, and in places desquamating. The abdomen was swelled, tympanitic slightly tender. The stools, 2-3 daily were pasty of butyric odour not very large and not yeasty. Needles of fatty acids were abundant. Blood showed 4 100 000 r.b.c.s 8 500 white corpuscles per cmm., haemoglobin 80 per cent. red cell diameter 6-7 μ . No free HCl in the gastric juice even after histamine. The blood sugar curve was low.

The pigmentation had appeared 18 years before, the digestive disturbances five years later. For ten years he had been on a strict diet of milk or tea and sugar white bread and butter for breakfast semolina or rice and milk at midday and once or twice a week a little minced veal. He was limited or limited himself to this meagre diet—one deficient in vitamins B₁, B₂ and C. He had frequent occipital headache and always felt cold.

His diet was improved, but changes were badly tolerated. He was given pepsin and hydrochloric acid, two injections of *Héparglandol* Roche and, thrice daily for 10 days, nicotinic acid. The general condition improved. Vomiting was much less, fatty acids disappeared from the stools, but the pigmentation remained unaffected. The case appeared to be one of pellagra with commingled symptoms of early sprue

H. H. S.

DE LANGEN (C. D.) Het verloop der bloedvetcurve bij spruw. [The Blood-Fat Curve in Sprue.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Oct 8 Vol. 80 No 41 pp. 2381-2399 With 6 charts

As a result of estimations carried out on sprue patients before and after treatment, Professor de Langen has found that sprue patients after taking fat in the form of butter show a flat and usually a low level curve of blood-fat in place of the normal rise of 50-80 per cent. in sprue the increase is never above 20 per cent. A similar flattened curve is seen after a glucose test. In both cases there is disturbance of absorption from the small intestine. When liver extract is administered parenterally the curve tends to approach the normal, and the "impure" preparations are more active in this respect than are the purified products. Treatment with nicotinic acid has a varying effect on the blood-fat curve while cortine brings about no improvement.

H. H. S.

HANES (Frederic M) & REISER (Raymond) The Relation of Phosphorus to Fat and Glucose Metabolism in Sprue.—*Amer J Med Sci* 1940 Nov Vol 200 No 5 pp 661-664 With 1 chart. [23 refs]

The study was directed to obtaining evidence or refutation for the theory of VERZAR that the underlying physiological defect in sprue is a breakdown in the phosphorylating mechanism of absorption. The normal phosphorus changes in sprue after intravenous injection of glucose and the close parallel between the degree of elevation of the respiratory quotient and blood sugar after glucose has been taken by the mouth can be taken as evidence that the patient is capable of metabolizing glucose normally after it is in the blood. Consequently the delayed fall in the serum phosphorus after glucose ingestion can be explained solely on the basis that the sugar reaches the blood-stream very slowly and is then as slowly absorbed. This does not support the theory of THAYSEN that the low blood sugar curve is due to abnormally rapid assimilation of the absorbed glucose by starved tissues.

Similarly the delayed fall in respiratory quotient and the corresponding slight increase in blood fats and the failure of any serum phosphorus response after oil ingestion run parallel to conditions after glucose ingestion and make it evident that abnormal phosphorus changes result from the failure of the metabolite to reach the blood at a normal rate. Sprue patients do not exhibit the normal fasting diurnal variation in phosphorus excretion and after ingestion of olive oil there is an increase in urinary phosphorus excretion whereas there is a decrease in normal persons but there is no significant change in serum inorganic phosphorus.

These findings as well as the delayed changes in respiratory quotient after oil and glucose meals indicate the slow rate of intestinal absorption in sprue.

P M B

ERF (L A.) & RHOADS (C P) The Glycine Tolerance Test in Sprue and Pernicious Anemia.—*J Clin Investigation* 1940 Mar Vol 19 No 2 pp 409-421 With 7 figs [14 refs]

FAIRLEY BARKER and Rhoads by sugar and fat tolerance recordings have shown that absorption of these substances is improved after treatment of sprue patients with liver extract and GROEN has similarly observed increased rate of glucose absorption by the intestinal tract in three cases of pernicious anaemia after similar therapy.

From these observations the conclusion was reached that in both sprue and pernicious anaemia dysfunction of the intestinal tract could be corrected by some constituent of liver extract but so far no evidence has been advanced that it is also poorly absorbed when given by the oral route.

Accordingly studies have been made on the absorption of an amino acid—glycine—by sprue and pernicious anaemia patients as well as those suffering from other disorders such as ulcerative colitis and other varieties of anaemia and hepatic cirrhosis.

The glycine tolerance test was effected by the oral administration of 25 gm of glycine dissolved in 500 cc of water to the fasting patient at 9 a.m. Blood samples were withdrawn before the amino acid ingestion and subsequently at hourly intervals till 3 p.m. Urine was collected in two series over the whole of the six hours of the test.

Plasma amino nitrogen, plasma and urinary urea nitrogen levels were determined by the method of van Slyke.

In four patients with untreated sprue and pernicious anaemia the results of glycine tolerance tests suggested that glycine was more slowly absorbed from the gastrointestinal tract than normal, but evidence of this abnormality was not found in the same cases after the administration of liver extract.

A similar malabsorption was not demonstrated in other patients with intractable diarrhoea severe anaemia, or pernicious anaemia during remission, but was present in two patients with hepatic cirrhosis.

P M B

CHITRE (R G) & PATWARDHAN (A N) Studies in Calcium and Phosphorus Metabolism. Part IV The Absorption of Calcium from the Intestine.—*Indian J Med Res* 1940 Oct Vol 28. No 2 pp 361-369 [28 refs]

In view of the widely if not generally accepted fact that low blood calcium in sprue is due to defective absorption the experiments carried out by the authors on absorption of calcium from the intestine (duodenum) of normal dogs is of some interest. The salt chloride or lactate was introduced into the duodenum of the dogs under anaesthesia and the calcium and phosphorus in the portal blood serum and the mesenteric lymph were estimated, the calcium by Wang's method the phosphorus by that of Bell and Doisy. It must be mentioned that they were careful to estimate the effect, if any of anaesthesia on absorption. They found that prolonged anaesthesia (3-4 hours) was followed by a definite though small, drop in the serum calcium.

Introduction into the duodenum was succeeded by a rise in the calcium content of the portal serum and the mesenteric lymph, showing that the portal venous system and the mesenteric lymphatics both play a part in absorption of calcium from the intestine. No relationship was observed between the rise in Ca in the portal blood serum and (a) the dose or the concentration of calcium salt (b) the pH of the solution introduced or (c) the pre-absorption level of Ca in blood serum.

H H S

MACKIE (Thomas T) & MILLS (Moore A) Changes in the Small Intestine associated with Deficiency Disease.—*Amer J Digestive Diseases* 1940 Nov Vol 7 No 11 pp 480-483 [17 refs]

The principal interest of this paper for readers of this *Bulletin* is the description of the X-ray appearances of the small intestine indicating functional changes which the author states are to be seen in idiopathic steatorrhea, chronic ulcerative colitis complicated by deficiency disease and in tropical sprue. The changes are characteristic and are most commonly seen in the duodenum and jejunum.

"The mucosal markings are coarser than normal. There is striking variation in the contour and size of the lumen and abnormal collections of gas may be present. The normal motor activity is disturbed, frequently producing a segmented distribution of the barium in dilated and isolated coils. The opaque meal usually passes through the jejunum slowly and irregularly. The filled areas show no evidence of peristalsis. At times all of the barium which has left the stomach is collected in a localized segment while the remainder of the jejunum and the duodenum

are empty Gastric emptying is irregular corresponding apparently to the delay in the forward progress of the opaque meal through the small intestine Although the rate of passage of the barium through the small intestine is subject to wide variation, the forward progress of the opaque meal is not more rapid than normal A twenty four hour residue in the cecum and ascending colon is not uncommon

The association of these changes with clinically obvious deficiency disease complicating ulcerative colitis and their invariable presence in active sprue strongly suggest that they contribute to the deficiency state by interference with absorption and thus tend to produce a vicious ascending spiral

The actual clinical conditions investigated and reported on in this paper comprised principally ulcerative colitis the findings in sprue are the result of previous work see this *Bulletin* 1936 Vol. 33 p 64

C II

MARKOFF (Nicola) Weitere Beobachtungen zur Pathogenese und Symptomatologie der einheimischen Sprue [Pathogenesis and Symptomatology of Non-Tropical Sprue]—*Schweiz Med Woch* 1940 Nov 30 Vol 70 No 48 pp 1137-1139 With 2 figs [17 refs]

Three main lines of approach to this difficult subject can be distinguished. The disease may be due to (1) a primary gastric lesion (2) a vitamin deficiency (3) a disturbance of internal secretion. The main protagonists of (1) are HANSEN and JECKLEN of (2) CASTLE and POCK-STEEH and of (3) VERZAR on suprarenal and J. BAUER on pituitary. Pathologo-anatomical investigations by Jecklen have recently revealed a chronic inflammatory process in the stomach duodenum jejunum and ileum and SCHEMBRA has described similar changes in the mesenteric glands. From systematic X-ray examination of the digestive tract Schembra and MOHR also distinguish chronic inflammatory changes in the duodenum and small intestine. There is apparently some connexion between this chronic intestinal disturbance and porphyria. In a case under discussion the appearances were those of a paralytic ileus of the small intestine with well marked porphyrinuria which disappeared under appropriate treatment.

The symptomatic picture of sprue can be reproduced by gastro-colic fistula changes in the pancreas tuberculous and even lympho-granulomatous mesenteric glands. The effects of surgical resection of the small intestine can interfere with absorption of water sugar fats and albumin. Recently BAUMGARTNER has emphasized the importance of intestinal hurry and lack of resorption of predigested material by the large intestine consequent upon such an operation. Steatorrhoea is the principal feature and there is interference with albumin absorption although carbohydrate metabolism is maintained and now NOLTZEL has recorded the supervention of pernicious anaemia in one patient nine years after such an operation. The anamnesis of one of the cases under survey (in a man of 27) shows that the main symptoms of sprue were produced by resection for paralytic ileus of a portion of the small intestine 1.5 metres in length (ileocaecal resection with ileotransverse colostomy). The patient had undergone primary appendectomy followed six months later by operation for paralytic ileus. The main result of the second operation was to produce steatorrhoea grave emaciation, and macrocytic anaemia with normoblasts osteoporotic changes also developed in the sternum the vertebrae

and pelvis. Indican and urobilin appeared in the urine. The serum calcium was reduced to 8.4 mgm. per cent concurrently with the appearance of Chvostek's sign. The commencement of this process has undoubtedly in a chronic gastroenteritis. KNITTEL has also described a case in which after a perforated appendix three separate operations of small intestine resection for ileus had to be performed and in which the classical syndrome of pernicious anaemia supervened. As explaining the chronic inflammatory changes in the small intestine and their connexion with the sprue syndrome PLUM, PREMEX & WARBURG'S observations on chronic ileitis are important. Ileitis occurs in an acute as well as in a chronic form and the latter may assume either the clinical picture of ulcerative colitis or of non-tropical sprue. From this observation it appears legitimate to conclude that local inflammatory changes in the ileum may lead to sprue symptoms, with a hyperchromic megalocytic anaemia responding as does the naturally occurring disease, to liver therapy.

An illustrative case is cited of the gradual unfolding of the sprue syndrome in a man of 42 with the typical biochemical background of that disease. The main interest lay in the fact that the illness commenced as a mild gastro-enteritis, possibly and primarily due to a water-borne infection. It is concluded that everything points to a central focus of a peculiar form of gastro-enteritis and that therefore what is known as non-tropical sprue is a clinical syndrome and not in reality a disease *suu generis*. The main location of the disease process is the whole length of the small intestine. A primary endocrine disturbance as a possible hypothesis is discarded. [The views expressed in this paper confirm those already recorded in this Bulletin 1941 Vol 38 pp 7-123]

P M B

ALLEN (J Garrott) The Comparative Prothrombin Responses to Vitamin K and Several of its Substitutes in a Case of Nontropical Sprue.—*Br England J of Med* 1941 Jan 30. Vol 224 No 5 pp 195-197 With 1 fig [10 refs]

BUTT SNELL and OSTERBERG [*J Amer Med Assoc* 1939 Vol 113, p 383] and ENGEL [*Med Welt* 1939 Vol 13 p 120] have found that prothrombin deficiency may play its part in non-tropical sprue. The reduction of plasma prothrombin in sprue probably indicates that general impairment of absorption and utilization of fats has taken place including the fat-soluble vitamin K.

In the present communication a case of non-tropical sprue is reported in which tendency to severe haemorrhage was noted—a feature which was to some extent remedied by the administration of vitamin K. The case is of further interest in that opportunity was afforded over an eight-month period of comparing the relative antihæmorrhagic values of various preparations in the same subject. The patient had suffered for three years from signs and symptoms of sprue including glossitis. A moderate macrocytic anaemia was present when after treatment on general lines for eight months, the hæmorrhagic tendency declared itself by epistaxis, bleeding from the gums and ecchymosis. The prothrombin concentration was 15 per cent. of the normal, but on an "alfalfa" concentrate in doses of 2 cc. four times daily it reacted slowly to 38 per cent., after which no further bleeding occurred for a while but when it fell again to 33 per cent. of the normal, hæmorrhages were once more noted.

Another vitamin K substitute—2 methyl I 4-naphthoquinone (Lilly) in doses of 2 mgm four times daily produced a normal prothrombin rate within 13 days. Subsequently synthetic vitamin K—2-methyl-3-phytyl-I 4-naphthoquinone (Merck) was tried out and the conclusion was reached that the second named compound was the most active. The *raison d'être* of this study rests upon the well established fact that the absorption of the fat-soluble vitamin K is essential for the formation of prothrombin by the liver so that any defective absorption of the vitamin or any impairment of production of prothrombin by the liver may lead to prothrombin deficiency

P M B

CHILDS (Alice) & DICK (George F) **Pancreatic Function in a Case of Nontropical Sprue.**—*Arch Intern Med* 1940 Oct. Vol. 66 No 4 pp 833-847 [43 refs.]

So far little attention has been devoted to pancreatic function or the use of pancreatic preparations in the treatment of nontropical or tropical sprue

This subject is one of considerable difficulty since criticism has been levelled at the value of tests as indication of pancreatic function. Quantitative analyses of stool with special emphasis on the partition of fats as well as determinations of the wet and dry weight and of total amount eliminated per day should furnish additional information with regard to intestinal digestion and therefore with regard to pancreatic function and these have been employed in the study under review

A case of non tropical sprue in a woman is here described which conformed with the points of diagnosis brought out in the literature. Chronic recurring steatorrhoea with bulky foul smelling stools marked emaciation glossitis macrocytic anaemia multiple vitamin and mineral deficiencies amenorrhoea and nutritional oedema were present

The greatest improvement in the condition of this patient occurred during the first period in hospital where therapy consisted solely of a constant diet with a fairly high fat content and administration of pancreatic juice. The stool decreased in wet and dry weight in the percentage of fat and in the total amount eliminated daily. The fact emphasized that pancreatic juice (Armour's pancreatin) brought about a more definite decrease than did liver extract alone is evidence that some factor of value on intestinal digestion, possibly present in pancreatic juice was deficient in this case. The partition of fat with low values for neutral fat and high values for soaps and free fatty acids is evidence for a definite fat splitting. It is claimed that further evidence of normal pancreatic function is furnished by the values for nitrogen in the dried stool, which never exceeded 3.5 gm. daily and by the results obtained from tests on fasting duodenal content. The findings suggested that in a typical case of nontropical sprue there exists a deficiency in some as yet undemonstrated pancreatic factor.

With the use of dried pancreatic substance an increase of appetite occurred but when the preparation was discontinued for an interval anorexia appeared, but appetite was regained when this preparation was resumed. The macrocytic hyperchromic anaemia present at the first admission gradually changed to normocytic hypochromic type

after pancreatic juice alone was administered. The reticulocyte response was greatest after oral administration of liver extract at a time when the haemoglobin concentration and the erythrocyte counts were at their lowest.

P M B

O SULLIVAN (John F) *Gee-Thaysen Disease (Idiopathic Steatorrhea of Adults and Adolescents in Non-Tropical Countries)* With a Note and a Postscriptum by Henry Moore—*Brit Med J* 1941 Feb 8 pp. 183-187 14 refs.

This paper may be considered as a further contribution to the vexed subject of the steatorrheas and as an attempt to stabilize the somewhat bewildering nomenclature which has cluttered up this subject. As coeliac disease was first described by Samuel Gee in 1888 and the condition as it occurs in adults was extensively studied by THAYSEN (1929-1932) the cognomen of Gee-Thaysen disease is retained as first suggested by MOORE, O'FARRELL, GERAGHTY, HAYDEN & MORIARTY in 1936 and later supported by MOGENSEN (1937) whilst Gee-Herter disease is suggested for the infantile form.

The paper concerns itself with two cases, taking into consideration the recent work of KANTOR (1939) upon a further diagnostic feature in the radiographic appearances of the small intestine such as the obliteration of the usual markings of the valvulae conniventes ("moulage sign") and dilation with segmentation of the contained barium into "clumps". In neither of the two cases could it be said that Kantor's findings were evident. In the treatment of the two cases the authors were guided by the experiments of Barker & Rhoads who found in tropical sprue that parenteral administration of liver extracts exerts a specific effect upon the absorption power of the small intestine and the experience of SVELL (1939) who showed that the radiographic appearances of the small intestine were restored to normal by the same therapy.

The first case was that of a single man of 28 with steatorrhea whose stools upon regulated hospital diet weighed 40 oz. daily and in whom other features tallied with the generally accepted description of the disease. Beard and moustache were absent, the testicles were small and there were other signs of infantilism. Radiographic examination showed that the epiphyses of the lower ends of the ulnae were united to the shafts, whilst those of the lower ends of the radius, tibiae and femora were but partially united. The bones of the hand showed a moderate degree of bony sub-calification. There was marked redundancy and dilation of the colon. The patient was put on a low fat diet consisting of 218 gm. carbohydrate, 83 gm. protein and 77 gm. fat. Therapy consisted of 25 minims of dilute HCl with pepsin, thrice daily after meals, 9 grains of ferrous sulphate, 40 gm. calcium gluconate, 25 mgm. calciferol and a vitamin preparation furnishing a daily intake of 18,600 I.U. vitamin A, 150 I.U. vitamin B., 30 Sherman units B., 600 I.U. vitamin C and 2,700 I.U. of vitamin D. Under this treatment the bulk of faeces was reduced to 22 oz. daily—diarrhoea relieved and steatorrhea reduced from 73.47 to 34.48 gm. total lipid in 24 hours, there was a gain in weight of more than 42 lb. and an increase of an inch in height. The diagnosis of Gee-Thaysen disease might be called in doubt because of the high faecal nitrogen (8.34 gm.) which would suggest pancreatogenous diarrhoea, but other

features—the flat sugar-curve and the absence of muscle fibres in the stools as well as the general clinical course of the case—negated this suggestion.

The second case was in a man of 19 years with pronounced anaemia and brownish pigmentation over the malar regions beard and moustache being absent. Examination showed a slight degree of hypocalcaemia steatorrhoea infantilis non union of epiphyses and a severe degree of anaemia. Treatment was conducted on lines similar to the first reinforced with four courses of intramuscular liver extract 2 cc. daily for four days. A most satisfactory clinical response was produced the anaemia rapidly disappeared and the improvement was accompanied by the disappearance of the heart murmurs and a striking change in the patient's appearance. For the past year the only treatment has been a low fat diet 25 minims of dilute HCl with pepsin thrice daily after meals. After a year's interval he had gained 33 lb in weight and 2 ins in height and is now an active healthy medical student.

In this second case the high percentage of neutral fat (21.68 per cent.) is discussed. FOWWEATHER (1926) has stated that where neutral fat exceeds 11 per cent of the dry matter defective fat splitting should be suspected, but if total split lipid exceeds 16 per cent of the dry matter deficient fat absorption is present. The probable explanation is the rapid rate at which the food passes through the intestine and the consequent failure of the pancreatic ferments to exert full action. In this instance after treatment the percentage of neutral fats fell to 6.25 per cent—which is well within normal limits. To both these patients an allowance of 2 gm protein per kilo body weight was made—an equivalent of 90 gm daily—which is considered advisable.

Prof. MOORE contributes some individual observations to the effect that in the great majority of cases the fundamental fault lies in imperfect absorption from the small intestine though in a small minority lacteal obstruction may possibly play a part. The most important factor seems to be imperfect lipid absorption so that the abnormal amount of these bodies in the bowel is responsible for the diarrhoea and also for imperfect calcium phosphorus haematopoietic bodies and vitamin absorption. He has followed up 11 out of the 12 cases previously reported upon for a period of 14 months to 15 years seven for over five and two for over three years. After the initial period of low fat diet and replacement therapy seven remained in good health for prolonged periods on low fat diet alone. His experience contrary to the view usually held is that results of treatment are most satisfactory notwithstanding that six out of the 12 could be classified as very severe and four as less so. Three had multiple pathological fractures which yielded to treatment and yet only one died of the disease itself others of pneumonia and tuberculosis whilst of the nine surviving up to date six are in excellent health. Arising out of the paper of BENNETT and HARDWICK Moore believes that the one aetiological factor running through coeliac disease in infancy or persisting to adult life in idiopathic steatorrhoea beginning adult life or tropical sprue is chronic jejuno-ileal insufficiency but the manifestations of this deficiency probably differ according to age the time of onset duration environment and other factors. With such a common fundamental defect it may not be easy to say whether an adult case is more closely allied to tropical sprue than to infantile coeliac disease [See also this *Bulletin* 1941 Vol. 38 p 274]

P. M. B.

PELLAGRA AND OTHER DEFICIENCY DISEASES.

PRECIS OF ABSTRACTS IN THIS SECTION

SUTTOY and ASHWORTH (p. 397) report cases of pellagra in which the symptoms responded to extract of the pituitary gland, but which relapsed when this treatment was discontinued. BEGUTHSTEIN (p. 397) describes a case of atypical pellagra in which he suspected disturbance of the suprarenals.

SIMONOV (p. 398) describes a fatal case in which a diagnosis of pellagra was made in a girl in England. JERSILD (p. 398) describes a case of pellagra in which psychic symptoms were not relieved by nicotinic acid but responded to liver extract.

ELVENJEW (p. 398) discusses methods of assaying nicotinic acid and the content of this substance in articles of diet. The deficiencies of other members of the vitamin B complex in pellagra are discussed. It is concluded that only nicotinic acid and related substances have potency against black tongue of dogs. The coenzyme I content of animal tissues is discussed, and the nicotinic acid content of tissues of animals suffering from deficiency in that substance.

VAJJAR and HOLT (p. 400) discuss a blue fluorescent substance in urine which is apparently a measure of the store of nicotinic acid in the body and which is absent in pellagra. They describe a second fluorescent substance not normally present which is found in the urine in pellagra, and discuss the significance of these findings. BASERGA and FORNAROLI (p. 400) describe a method of estimating nicotinic acid in urine and the response to the administration of 150 mgm. A low reading is regarded as an indication of deficiency.

JIMENEZ GARCIA (p. 401) describe cases of glossitis observed in Madrid during the Spanish Civil War when the diet of the population was seriously inadequate especially in vitamin B₃. Some of the patients recovered in spite of the deficiencies in the diet, but in others retrobulbar neuritis, neuritis of the auditory nerve and pellagra developed. There were disturbances of sensation and neuralgias. Hypochlorhydria was common and indigestion occurred. The value of treatment was difficult to assess since the tendency was towards recovery, but the results with nicotinic acid were variable. Brewers yeast was apparently beneficial.

VAN LEEUW and DHANOEINROTQ (p. 402) record cases of nutritional oedema in Central Java. The syndrome is not distinct and clear cut and is complicated by malaria, dysentery and hookworm disease. Low blood nicotinic acid values were found, but it was observed that these were not directly connected with pellagra-like symptoms exhibited by some of the patients but were closely connected with low blood cell volumes.

STILES *et al.* (p. 404) have endeavoured to find some easily stored and palatable food having the same therapeutic properties as yeast and liver extracts since they found that patients did not take the latter for long periods when released from supervision. Peanut butter blended with brewers yeast powder was found to be suitable. It tends to prevent pellagra, beriberi and riboflavin deficiency.

ERDMANOV (p. 405) describes lesions, which resembled each other in animals given diets deficient in vitamin B₃, riboflavin and nicotinic

acid. The skin lesions of human pellagra most closely resemble those of vitamin B₂ deficiency in rats but the complete picture of human pellagra cannot be produced in animals.

BICHEL and MEULENGRACHT (p. 406) report pellagrous skin changes originating in a patient who had been under treatment with riboflavin. HOU (p. 406) describes a syndrome apparently due to ariboflavinosis, in Chinese in Shanghai. The lesions are chiefly ocular and unlike cases described in America there are few affections of the lip and tongue. Riboflavin produces rapid cure but vitamin A and nicotinic acid have no effect.

CLARE (p. 406) points out that cheilosis is common in West Africa in people whose diet consists largely of cassava which is rich in riboflavin and explains this anomaly on the hypothesis that this food contains a cyanogenetic glucoside linamarin the consumption of which inhibits the action of the suprarenals which normally phosphorylate riboflavin. He postulates a similar substance in maize and concludes that five times as much riboflavin is needed to preserve health in subjects fed upon maize diets as in those on monotonous diets without maize. DAVIS comments on these views. C II

SUTTOV (Don C.) & ASHWORTH (John) *Interrelation between the Vitamin B Complex and the Anterior Lobe of the Pituitary Gland.*—*Jl Lab & Clin Med* 1940 Aug Vol. 25 No. 11 pp 1188-1192. With 2 coloured plates

To state the authors conclusions first. Evidence is presented indicating that an extract of the anterior lobe of the pituitary gland will cause recovery of pellagra lesions when they have failed to respond to nicotinic acid and riboflavin parenteral liver and adequate diet.

Two patients came under observation suffering from diarrhoea loss of weight oedema of the feet glossitis gastritis achlorhydria proctitis and minor mental changes but no dermatitis. As no response to nicotinic acid was obtained the diagnosis of pituitary cachexia was considered and an extract of pituitary gland was given with excellent results. Three cases of pellagra with typical dermatitis on face hands and feet and affection of the scrotum and angles of the mouth glossitis and diarrhoea were then given the same treatment. All three showed rapid response but relapsed a few days after the treatment was discontinued. The preparation used was polyansyn (Armour & Co) and 2 cc intramuscular injections were given daily.

H S Stannus

BEGUIRISTAIN (J) *Un caso de síndrome incompleto y anómalo de pelagra.* [A Case of Pellagra with Anomalous Symptoms.]—*Rev Clin. Española* Madrid. 1940 July 1 Vol. 1 No. 1 p. 55

The patient was a man of 50 years whose diet for the last 18 months had comprised exclusively bread potatoes and a little fat. In September 1939 he had lost 20 kgm in weight showed generalized hyperpigmentation ichthyosis and weakness so that he could scarcely stand. The pigmentation was most marked on the legs genitalia and trunk (the patient was verminous) less on face arms and hands. There were crusts of impetigo and pyodermatitis on legs forearms

neck, hands and face. Blood examination gave red cells 2,800,000 white 10 640 per cmm. polymorphonuclears 77 per cent. lymphocytes 15 monocytes and eosinophils each 4 per cent. Facies and gait were Parkinsonian.

The diet was rectified and in a month the patient gained 4 kgm. in weight. By the following February he had gained another 3 kgm. and the pigmentation was much less noticeable. The pyodermal crusts separated, leaving unpigmented atrophic skin, imparting a mottled appearance to the thighs legs and forearms. He was now given fresh brewers yeast and improved rapidly. By March he was able to take exercise in the open and in 18 days gained more than 5 kgm. Blood examination gave red cells 4,500 000 per cmm. white 9,000 relative percentages about the same as before. There remained the Parkinsonism with rigidity and tremor of legs.

There was notable absence of the mouth and tongue lesions of pellagra and the author suggests that there may have been adrenal disturbance to account for the pigmentation and debility H H S

SMITHSON (R. E. Hope) Fatal Pellagra in an English Schoolgirl.—*Lancet* 1940 Nov 9 pp 589-590

In May with the first constant sunshine the patient, a girl of 13 developed a rash on arms legs face and neck. This resembled exaggerated sunburn and there was some dry exfoliation. In August there was stomatitis and gingivitis and some fever. These improved in a few days with treatment for Vincent's angina but the rash remained. The blood picture was normal except for slight polymorphonuclear leucocytosis. When the patient was apparently recovering she had a convulsion, the rash became dusky blue-purple and innumerable tiny vesicles appeared on the knees, elbows and neck. She was cyanosed and confused and died in a few hours after passing into status epilepticus.

The patient was tall and thin had always refused milk and had always eaten much bread and butter. Vegetables had been available to her but meat had probably been restricted. There are four healthy siblings. The author regards the condition as pellagra. C W

JENSEN (Mogens) 2 Tillækle af Pellagra [Two Cases of Pellagra].—*Nordisk Med* 1941 Feb. 8 Vol. 9 No. 6 pp 426-428
With 2 figs. English summary

In one patient recovery was obtained at once after treatment with nicotinic acid. In the other case—although the skin symptoms vanished—haemorrhagic diarrhoea and psychical changes were noticed during treatment with nicotinic acid. These symptoms vanished after injection of Becoplex (Ido-preparation produced from fresh liver containing all components of the B- vitamin complex).

ELVEHJEM (C. A.) The Biological Significance of Nicotinic Acid.—*Bull. New York Acad. Med.* 1940 Mar Vol. 16 No. 3.
pp. 173-189 With 1 fig. [58 refs.]

The substance of this communication, the Harvey Lecture delivered in November 1939 comprises a valuable review of the biochemistry of nicotinic acid, together with some recent results of investigations undertaken in the author's laboratory.

Methods of determining the nicotinic acid content in various foodstuffs and tissues include chemical procedures bacterial growth methods and animal assays. The author considers the most satisfactory chemical method to be that in which the pyridine nucleus is broken down by cyanogen bromide and aniline to give a yellow compound which is measured colorimetrically. For animal assays dogs are employed. Black tongue is produced in them by a basal diet details of which are given in the text and subsequently the therapeutic response of each animal to various measured quantities of diet is compared with that previously evoked by standard amounts of nicotinic acid. The results of such bio-assays of a number of different articles of diet are summarized in a table in the text. Liver was found to contain 1.2 mgm per gm. dry weight. Assuming a daily human requirement of 25 mgm. nicotinic acid, it is concluded that $\frac{1}{4}$ lb. of fresh liver or $\frac{1}{4}$ lb. lean meat will suffice. In general natural foods contain from 1 to 100 mgm. of nicotinic acid per 100 gm. dry material.

Attention is drawn to the probable deficiency in pellagra of other members of the vitamin B complex. In this connexion it is of interest to note that dogs deprived of vitamin B₆ develop a severe microcytic anaemia which readily responds to synthetic vitamin B₆, while if the diet is supplemented with vitamin B₆ alone growth is arrested until pantothenic acid and factor W are added.

As a result of an examination for anti black tongue potency of a number of related compounds the author concludes that this property is possessed only by nicotinic acid, its amide and those compounds listed in the text which are capable of oxidation or hydrolytic conversion to these substances in the animal body.

The relationship between nicotinic acid and coenzyme 1 has been studied in the author's laboratory by the yeast fermentation method which is based on the principle that the addition of varying amounts of coenzyme 1 to a washed yeast preparation will produce rates of fermentation proportional to the amount of coenzyme 1 added. The results are given of estimations of the coenzyme 1 content of the tissues of several animal species. In spite of apparent differences in nutritional requirements there is relatively little variation in the figures for the different species.

Estimations on dogs and pigs suffering from severe nicotinic acid deficiency were compared with those of normal animals. In blood, brain and kidney no appreciable difference was detected in the coenzyme 1 content of the two groups but in liver and muscle from deficient animals there was a significant decrease as compared with the same tissues from normal animals.

The author's studies on human beings confirm the findings of KORN in that nicotinic acid deficiency does not result in a blood coenzyme 1 level below that found in normal subjects: 20-30 micrograms per cc. Excessive ingestion of nicotinic acid may however temporarily double the concentration of coenzyme 1 in the blood.

In conclusion the author affirms the probability that the rapid response of deficient human beings and animals following administration of nicotinic acid may be due to formation of coenzyme 1 when the nicotinic acid part of the molecule is made available. The rôle of coenzyme 2 in the metabolism of nicotinic acid is briefly discussed but acquisition of accurate data awaits improvement in technical methods.

L. J. Davis

NAJJAR (Victor A.) & HOLT (L. Emmett) Jr. The Excretion of Specific Fluorescent Substances in the Urine in Pellagra.—*Science* 1941 Jan 3 Vol 93. No 2401 pp. 20-21

In a previous communication Najar and Wood [this *Bulletin* 1940 Vol. 37 p. 78] showed that the amount of a blue fluorescent substance in the urine was apparently a measure of the store of nicotinic acid in the body. It has now been demonstrated that this substance is absent from the urine of pellagrins and that the ingestion of nicotinic acid, and other pyridine derivatives having anti-pellagra activity causes the reappearance of this substance. They have further shown that in the urine of pellagrins there appears a second substance not normally present which gives a whitish blue fluorescence without an alkali addition to the eluate after adsorption on zeolite and treatment with KCl. This they refer to as F_1 , the substance previously demonstrated as F_2 . Neither has been identified.

In pellagra the disappearance of F_2 appears to take place first, as the disease progresses F_1 increases in amount. Treatment with nicotinic acid reverses the process. The authors suggest that normally an enzyme of which nicotinic acid is a component converts F_1 to F_2 . In nicotinic acid deficiency states this fails to occur and F_1 accumulates. In black tongue of dog similar phenomena have been found.

H S S

BASERGA (A.) & FORNABOLI (P.) Schnelle Orientierungsmethode zur Aufdeckung des Mangels des PP Faktors. Rapid Method for the Discovery of Deficiency in the PP Factor.—*Min. Woch.* 1940 Sept 21 Vol 19 No 38 pp 988-989 With 3 figs. 11 refs.

The necessary reagents are —

1. Buffer solution, KH_2PO_4 , 7.04 gm. Na_2HPO_4 [quantity not stated in the paper, in 100 cc. water]

2. Freshly prepared brom-cyanide solution made by adding 50 per cent KCN solution to saturated bromine water until the colour just disappears

3. Saturated solution of aniline

Eight cc. of fresh clear urine are mixed with 2 cc. of solution 1. 5 drops of solution 2 and 5 drops of solution 3. After exactly 6 minutes the mixture is examined in a Zeiss graduated photometer with a 10 mm. cell and S45 or S47 filter. A control is employed by substituting 5 drops of water for the 5 drops of solution 2.

The procedure is to estimate by this test the nicotinic acid content of the first morning urine of the patient who after passing it, is given 150 mgm. nicotinic acid in three parts within half hour. The nicotinic acid content is again estimated in the total urine passed within the next six hours. The difference between the readings is related to the amount of urine passed and the total excreted is calculated. During this period no coramine or sulphapyridine must be taken and the patient must not smoke.

Low readings (of less than 1 mgm.) have been found in Lombardy in people who though showing no overt signs of pellagra are living on a low protein diet. A low reading is therefore an indication of deficiency.

C H

KOCHMAR (B D) The Quantitative Estimation of Nicotinic Acid in Blood and Other Body Fluids.—*Indian Jl Med Res* 1940 Oct. Vol. 23 No 2 pp 335-396 [13 refs]

HARRIS (Seale) The Genesis of Pellagra.—*Southern Med Jl* 1940 Oct. Vol. 33. No 10 pp 1044-1053 With 1 fig [45 refs.]

ORMSBY (Oliver S) Pellagra.—*Proc Inst Med. Chicago* 1940 Dec 15 Vol. 13 No. 9 pp 230-243. [35 refs.]

JIMÉNEZ GARCÍA (Francisco) Estudio clínico de los trastornos carenciales observados en la población civil de Madrid durante la guerra (1936-1939) I Glositis simple [Clinical Study of Avitaminosis among the Civil Population of Madrid during the Civil War (1936-39) I Simple Glossitis].—*Rev Cien Española* Madrid 1940 Sept 1 Vol. 1 No 3 pp 231-238 With 6 figs. [21 refs] French summary p 237

Early in 1937 sporadic cases of glossitis were coming under the author's observation and he noted as time went on that in spite of the patients remaining on the same poor diet as before some recovered others passed into a chronic stage which though at first regarded as a pre pellagrous condition did not develop into pellagra.

The author has carefully followed up 336 patients whom he classed as typical of simple glossitis. During the 32 months of the war there must have been several thousand cases. The majority of the 336 personally observed by the author were between 20 and 35 years of age but the limits were one month and old age about three times as many women as men were attacked. Loss of weight was marked the average being a little over 20 per cent but some lost much more. Most cases were seen in the last four months of 1938 during which an epidemic outbreak of simple glossitis occurred among the troops encircling Madrid. Some of the patients showed more serious deficiency symptoms and retrobulbar optic neuritis as described by Fitzgerald Moore in Nigeria [see this *Bulletin* 1936 Vol. 33 p 889] neuritis of the VIIIth cranial nerve and pellagra.

The nutrition of the civil population during the war was certainly inadequate its caloric value was under 1 000 proteins were less than half the necessary minimum for health and most of them were of vegetal origin minerals and vitamins were much reduced especially the vitamin B₂ complex. The daily diet for an adult contained protein 41.3 gm fats 12.9 gm carbohydrates 169.6 gm. caloric value 957. It is difficult to determine accurately how long would elapse on this diet before the glossitis appeared, but it seemed to be 4-5 months.

Clinically the cases could be fairly readily grouped as acute sub-acute and chronic the percentage proportions being approximately 8 82 and 10 respectively. The different forms or rather stages are described in detail in the article but this need not be repeated here.

Later symptoms were varied and included visual disturbances such as dimness of vision, scotomata diplopia, and even actual retrobulbar optic neuritis acroparesthesias formication, numbness pricking sensations neuralgia and pain in palms and soles vomiting occasionally diarrhoea more commonly. Of 80 patients specially examined 41 had achlorhydria 32 hypochlorhydria and only 7 were normal in this

respect. Most of those with subacute benign glossitis had hypochlorhydria or normal acidity; those with achlorhydria were the acute, the more serious, subacute and the chronic cases. Inducamuria was common.

As regards the course of the disease—those with the acute form after a period of days or weeks in a subacute stage, might rapidly clear up; the subacute might recover completely in 1–2 months, the chronic might continue for 5–6 months or even a year. Unless the more serious complications mentioned above supervened the trend was towards cure spontaneously; hence the difficulty of assessing the value of any treatment adopted. Diagnosis had to be made from pellagrous glossitis, pernicious anaemia and sprue. Various lines of treatment were followed: lemon juice, vegetarian diet, chlorate of potassium, nitrate of silver, mercurochrome, iodized glycerin, cod liver oil, vitamin A, C, B₁, B₂, lactoflavin, nicotinic acid, liver preparations and so on. Vitamin B in the form of brewers' yeast did good; the results with nicotinic acid varied. Those with acute glossitis and those with intestinal disturbance did best, and in the latter the intestinal and tongue symptoms improved together. It is only right to say, however, that many patients showed no amelioration when treated with nicotinic acid.

The author sums up his conclusions thus:—

1. The glossitis seen in Madrug, either as a single symptom or associated with other slight "deficiency" signs is a separate condition [he uses the term "distinct entity"] called by him simple glossitis.

2. Aetiologicaly it is a nutritional deficiency of vitamin B₂ complex—deficiency of some factor at present unknown and not of nicotinic acid or riboflavin.

3. The reduction or absence of this factor which causes simple glossitis is common to all the processes of which glossitis is a symptom—pellagra, paraesthesias, retrobulbar neuritis, ulcerative colitis, pernicious anaemia, sprue.

4. The reduction of this factor was manifested early and in a constant manner in Madrug.

5. This form of glossitis is not benefited therapeutically by vitamins A, B₁, C, D or riboflavin, and the effect of nicotinic acid is variable.

6. The most efficacious form of treatment is by brewers' yeast or its extracts containing the vitamin B₂ complex. H H S

VAN VEEN (A. G.) & RADEN SARDJONO DHANODIBROTO. Over nicotinezuurbepalingen bij voedingsoedeempatiënten in Midden-Java. [Nicotinic Acid Determination in Nutritional Oedema in Central Java.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940, July 2, Vol. 80, No. 27, pp. 1622–1637. With 1 chart. [Refs. in footnotes.] English summary.

"In the region around about Pemalang (Central Java) nutritional oedema occurred rather frequently in the year 1939. Its fundamental cause is to be found in a number of successive failures of crops. It is a remarkable fact, however, that, although the nutrition in these parts was deficient in many respects, only oedema and sometimes slight pellagra-like symptoms but no other deficiency symptoms have been observed.

Diet surveys were held at Pernalang by the Institute for Nutrition Research and also medical examinations were made. At the Eykman Institute a number of analyses were done regarding vitamin A, B₁, nicotinic acid and proteins in the blood of oedema cases and their families.

"In the publication in hand special attention is paid to the concentration of nicotinic acid in the blood of nutritional oedema cases (immediately after their entering the auxiliary hospital at Moga) of whom a certain number showed pellagra-like symptoms. Through lack of time and staff it was impossible to examine the patients thoroughly and to keep them under accurate observation nor could any therapeutic experiments be made on a large scale.

In consequence of the fact that the nutrition had been deficient for a long time and in practically every respect it was to be foreseen that no pure and uniform deficiency syndromes would appear. Moreover these syndromes were blurred by ankylostomiasis which is a frequent concomitant of poor nutrition and sometimes by various other diseases (malaria dysenteries).

In some cases low nicotinic acid contents were found in the urine ($\pm 50 \gamma/100$ cc.) Since with the handicaps attending the investigation it was impossible to get the 24 hours volumes of urine or to learn whether any anureses or strong diureses were present when the patients entered hospital these determinations do not have great value. For that reason they are not discussed in this publication. More attention was paid to the determination of the nicotinic acid level in the blood, after a technique combined from SWAMINATHAN and BANDIER'S. Low nicotinic acid levels did frequently occur in the blood of the oedema cases in the hospital. They were however not to be directly connected with the slight pellagra-like symptoms described in this publication, nor with the so-called porphyrin reaction of BECK-ELLINGER-SPIES which is no real porphyrin test. On the other hand we found a rather close connection with the blood cell volume (as determined by the haematocrit) in the sense that a low nicotinic acid level in our patients almost always attended by a low cell volume which was of frequent occurrence in these chronically underfed mostly very anaemic oedema cases. This connection between nicotinic acid content and haematocrit value depends on the fact that nicotinic acid does not occur in the blood serum.

With a normal cell volume a normal nicotinic acid level was usually found but at the same time pellagra-like dermal symptoms would sometimes occur.

The state of affairs with our nutritional oedema cases is therefore like this: most likely not only the food (principally Indian corn) is deficient in nicotinic acid but also the conveying intensity of the blood for nicotinic acid is often reduced by the low cell volume.

It would be interesting to know whether low cell volumes also play an important part with regard to the nicotinic acid supply of people with a classical pellagra. We have not been able to find any data on this subject in the literature except one single publication by MACHWILADSE in which we find mentioned that the number of erythrocytes and also of leucocytes is mostly reduced in pellagra cases without however having any direct connection with the seriousness of the case. If these observations generally held good one might always expect low nicotinic acid levels in the blood of pellagra cases. In this connection it may be interesting to note that LWOFF and his

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co-operators found normal nicotine and levels in 10 pellagra cases although they followed another technique than we did. It is a pity that no haematocrit values are mentioned by them.

"Finally we have to mention certain observations made by Křiváček who found in the blood of some pellagra cases nicotine acid values varying between 70 and 180 m. per cent., i.e. of the same magnitude as we found in many nutritional oedema cases. The nicotine acid secretion in the urine of his patients was lowered, to be sure but not at all very low although the pellagra symptoms were very characteristic: erythematous, here and there scaly skin with blackens on the face, the hand, brown pigmentation, follicular hyperkeratosis in the face, anorexia and diarrhoea. So he comes to the conclusion, that although theoretically the effect of nicotine acid in pellagra may be very striking, yet the connection between this disease and the nicotine acid level is not quite so simple.

"The brief result of our investigation is that the nicotine acid level of the blood of many nutritional oedema cases proves to be very low. The low nicotine acid content which on the one hand may be expected in consequence of the probably nicotine acid-deficient nutrition of the population was not connected with the sometimes occurring pellagra-like symptoms but with the low cell volume (haematocrit). Because of the importance of nicotine acid for the organism it is only as connected with pellagra but also with regard to blood formation the occurrence of these low nicotine acid levels is an unfavourable symptom.

SMITH (T. D. GRANT H. M.) & GRANT (J. M.) Observations on the Effectiveness of a Yeast Peanut Butter Mixture in Vitamin B Complex Deficiencies. A Progress Report—*Southern Med. J.* 1941 Feb. 1-4 34 No 2. Pp 150-161. Summary appears also in Bulletin B-2000.

The value of egg and liver extracts in the relief of symptoms due to deficiency of the vitamin B complex has been generally recognized, but whilst patients take these substances when under supervision, they refuse to continue to do so for long periods at home. It thus became desirable to substitute some more easily stored and palatable food having the same therapeutic properties. The most important of these is the peanut. It is efficacious in the gradual relief of mild deficiencies due to lack of water-soluble vitamins and in supplying a considerable quantity of energy material and protein of good quality but the 1 ounce per unit of weight have not been so good as those with high-grade brewers' yeast. It was then considered desirable to furnish peanut butter with synthetic vitamins or with yeast or liver extract. This mixture proved to be acceptable and promising up to a concentration of 25 per cent. yeast.

The Ambersuch, Inc. organization has supplied a commercial peanut butter blend, with strain E. A residual brewers' yeast powder twenty-five malnourished patients with mild pellagra, beriberi or riboflavin deficiencies were selected and studied. At the time of admission they were underweight and presented lesions diagnostic of one or more deficiency diseases. Each patient was given peanut butter containing 15 per cent. brewers' yeast at 4 1/2 ounces daily, and by the end of a week it became evident that the patients would continue to eat the mixture even when the yeast content was increased to 25 per cent.

It was then found desirable to replace 8 per cent. peanut butter with peanut oil. Some patients complained of a bitter taste of the stram k. mixture but no complaints were made when C-50 yeast was used. The majority of patients observed for two months consumed on an average 60-75 gm. of the mixture daily and a few as much as 160 gm. In most instances the appetite improved and the patients gained in weight.

It would be misleading to compare the gradual improvement in this series with the spectacular clinical remissions and even life-saving effects caused by large doses of nicotinic acid in pellagra, or by riboflavin in ariboflavinosis or by thiamin in vitamin B₁ deficiencies. It is estimated that 50 per cent. of the American people fail in optimum health and vigour because of low vitamin B intake. The authors therefore find that a mixture containing 25 per cent. brewers yeast powder 67 per cent. peanut butter and 8 per cent. peanut oil is an inexpensive palatable food mixture which tends to prevent pellagra, beriberi and riboflavin deficiency. Two ounces or more of this *per diem* used as a supplement to the diet gradually improves the health of persons with subclinical symptoms of deficiency disease.

P Manson-Bahr

EFREMOV (V. V.) Experimental Avitaminoses of the B₂-Complex Group and Pellagra of Man.—*Acta Med URSS* 1939 Vol. 2. No 4 pp 622-630

Lesions of a rather similar type were produced in rats, dogs and monkeys by diets deficient in vitamin B₂, riboflavin or nicotinic acid. The most frequent lesions noted were (1) erythroedema (B₂ deficiency in rats) or alopecia (riboflavin deficiency in rats and nicotinic acid deficiency in dogs and monkeys). None of these skin lesions was accentuated by sunlight. (2) stomatitis and glossitis (B₂ deficiency in rats) and various gastro-intestinal symptoms which were not associated with any obvious tissue changes in all species. (3) nervous disorders such as loss of muscle tone, ataxia, incoordination and paraplegia. Degenerative changes were found in varying degrees in the medulla, the postero-lateral columns of the spinal cord and the posterior roots. There were also localized degenerations of various nerves in rats and degenerative changes in the ganglion cells of the cortex cerebellum and stem nuclei in dogs and monkeys. A study of the skin lesions of human pellagra showed that they most closely resembled those of B₂ deficiency in rats. Exposure of pellagra patients to sunlight did not produce erythema and it appeared to be brought about by various types of irritation. All the patients showed disturbances of gastric secretion, and unlike what may be seen in animals atrophic gastritis leading to a form of ulcerative colitis occurred. Sore mouth and glossitis were often seen and in grave cases secondary infection occurred. Dogs and monkeys however showed no changes in the mouth or tongue and the condition of "Black Tongue" of dogs was not produced by a diet deficient in nicotinic acid. The greatest resemblance between human pellagra and animals deficient in components of the B₂ complex, was in the nervous lesions. All showed a picture resembling subacute combined degeneration whilst in man and dogs and monkeys degenerative changes in the ganglion cells of the brain were prominent. It is

concluded that owing to the varying susceptibility of tissues in different animals the complete picture of pellagra in man cannot be produced in animals. Deficiencies in any part of the B₃ complex may give rise to some lesions resembling those of human pellagra.

H N H Green

BICKEL (Jørgen) & MEULENGRACHT (E.) Pellagra opstaaet efter Behandling af Plummer-Vinson Syndrom med Riboflavin. Onset of Pellagra after Treatment of the Plummer-Vinson Syndrome with Riboflavin. — *Nordisk Med* 1941 Jan 18. Vol 9 No 3 pp 185-187 With 1 fig English summary (5 lines)

The authors report the case of a patient in whom treatment with riboflavin for a considerable period was followed by the appearance of pellagrous changes in the skin. They discuss the possibility of a connection between the riboflavin taken in and the development of these cutaneous changes.

HOC (H. C.) Riboflavin Deficiency among Chinese. I. Ocular Manifestations. — *Chinese Med J* 1940 Dec Vol 53 No 6 pp 618-623 With 5 figs on 2 plates. (19 refs.)

The author has discovered that a certain group of ocular manifestations is not uncommon among the Chinese of Shanghai. The lesions, it is believed, are due to an arboflavimosis inasmuch as they clear up with the administration of riboflavin. Patients exhibiting these signs form about 8 per cent of those attending an eye clinic. Forty cases were studied, including four which also had the symptoms of frank pellagra. The lesions observed, in order of frequency were: pericorneal injection, bulbar conjunctivitis, photophobia, vascularization of the cornea, blurring of vision, phlyctenules, corneal opacities, corneal ulcers, blepharitis and iritis. They thus resemble those cases described by American writers. There are however two points of difference. Phlyctenules have not before been noted in this syndrome and while American observers find a pretty close association of these ocular manifestations with "cheilosis," glossitis and seborrheic dermatitis, among the Chinese affections of lip and tongue occurred in comparatively few.

The condition cleared up in from 2-7 days on treatment with riboflavin by mouth—5 mgm. thrice daily for 2 days twice daily for 3 to 10 days and then once daily for a further 7 days. Vitamin A and nicotinic acid had no effect.

The author suggests that lack of riboflavin may be a factor in all cases of phlyctenular disease.

H S S

CLARK (Alfred) Concerning Riboflavin. — *J Trop Med & Hyg* 1941 Feb 1 Vol 44 No 3 pp 15-17

Dr Clark has previously suggested that pellagra may be the result of disordered metabolism due to the ingestion of cyanides in the food. In the present communication he enlists further support for his hypothesis from the consideration of the circumstances determining the

prevalence of cheilosis in various communities. Cheilosis is the syndrome of skin lesions around the mouth frequently associated with pellagra which has been attributed by SEBRELL to riboflavin deficiency.

The author points out that this condition is common in West Africa among those classes whose diet consists largely of cassava which is rich in riboflavin. This anomaly he explains by the presence in cassava of a cyanogenetic glucoside linamarin. Reference is made to the work of VERZER *et al* claiming phosphorylation of riboflavin to be a normal function of the adrenals, which is inhibited by the presence of cyanides and attention is drawn to the significance in West Africa of the great frequency of the occurrence of cheilosis and of adrenal lesions. [No reference is quoted in support of this statement]

The thesis is then developed that a substance of similar inhibitory activity may be present in maize mandelic nitrile is suggested. Lists of diets with the riboflavin contents of the various articles of food are submitted and it is pointed out that cheilosis is not observed among English working classes on diets comparing unfavourably in riboflavin content with the maize-containing diets given to inmates of the Kumasi Gaol Infirmary. The data of Sebrell, working in Georgia U.S.A. are also quoted and it is concluded that five times as much riboflavin is needed to preserve health in subjects fed upon the maize-containing diet as is required for people on a very monotonous diet without maize.

[The evidence upon which the author's conclusions are based does not appear to be unassailable. Further work is desirable before cheilosis or angular stomatitis deserves critical acceptance as a pathological entity due essentially to riboflavin deficiency. Other workers—e.g. AYKROYD *et al*—have claimed that nicotinic acid deficiency results in a similar syndrome. Furthermore the findings of Verzer and his co-workers on the rôle of the adrenals in riboflavin metabolism await confirmation.]

Nevertheless the aetiology of pellagra and its associated syndromes is a problem still requiring an unequivocal explanation for recent improvements in methods of nicotinic acid assay of foodstuffs are resulting in data which do not appear to strengthen the arguments favouring the notion that pellagra is a consequence of a simple dietary deficiency. The idea that exogenous or endogenous inhibitory factors may play a part in the causation of the condition accordingly deserves consideration. The publication therefore of Dr Clark's plausible theory even if it does not result in its immediate acceptance should fulfil a useful purpose in stimulating further enquiry along the lines suggested by its author.

A misprint appears in the list of the riboflavin content of foodstuffs extracted from FIDGEN and ROSCOE's tables. The figures should read mgm per 100 gm not per 500 gm. as printed.]

L. J. Davis

MALARIA.

PRECIS OF ABSTRACTS IN THIS SECTION

BROWN (p. 408) discusses the deaths due to malaria in Georgia, U.S.A., during 1937 giving details of 101 patients certified as having died from this disease. He emphasizes the importance of expert diagnosis. PINOTTI (p. 409) states that almost one-third of the population of Brazil are infected, and malaria as a cause of death is surpassed only by tuberculosis and intestinal diseases. He refers to the introduction of *A. gambiae* from West Africa.

GILL (p. 410) refers to the vital statistics, which are remarkably good, of Ceylon, in relation to the influence of malaria upon natality. On the basis of spleen rates the island can be divided into five zones, and the death rates and infant mortality rates appear to reflect the baneful effects of malaria. Endemic and epidemic malaria have little influence on natality but increase the frequency of stillbirths. High degrees of immunity confer partial protection against these accidents of pregnancy.

BOYD (p. 411) records observations on patients undergoing therapy with quartan malaria. These cannot be further abstracted, but it is noted that one patient died of the disease after having shown, on one occasion, the high parasite density of 114 000 per cmm. As a rule the parasite densities seen were relatively low.

DULANEY and STRATMAN THOMAS (p. 411) have prepared antigens, for complement fixation reactions in human malaria from *P. knowlesi*, *P. vivax* and *P. malariae*. These give strong group reactions but do not cause skin reactions. The complement fixation reactions are strongly correlated with the presence of parasites in the blood, but negative reactions cannot be taken as certain indications of the absence of parasites. The test may be useful in *P. falciparum* infections when parasites, though present in the body, are absent from the peripheral blood.

TALIAFERRO and KLUVER (p. 412) have studied *P. brasilianum* infections in monkeys. They consider that lymphoid hyperplasia in malaria augments the mesenchymal reserve from which monocytes and newly formed macrophages arise.

HUFF (p. 413) discusses the size variability and growth rates of oöcysts of different strains of avian malaria parasites.

As a result of experiments in which sporozoites of *P. gallinaceum* were inoculated into chicks, SHORR *et al.* (p. 413) conclude that the sporozoites are taken up by the endothelial cells where they multiply by schizogony and increase in number until merozoites enter the red cells. Exoerythrocytic schizogony continues as a low-grade infection and this may be responsible for those cases of malaria in which gametocytes are the only blood forms present. LUMSDEN and BERTRAM (p. 414) have studied the biology of *P. gallinaceum* in fowls. The asexual cycle is one of 36 hours and gametocytes appear in the blood at the time when asexual forms are first seen.

TO and CHO (p. 414) find that the hydro-derivatives of cinchona alkaloids, though more toxic than the basic substances, are effective in much smaller doses in avian malaria, but in comment WENTON notes that the observations do not agree with those of other workers.

LUMSDEN and BERTRAM (p 414) have investigated the action of plasmoquine and praequine in various doses on the development of gametocytes of *P. gallinaceum* in fowls. AFRICA *et al* (p 415) report on prontosol in avian malaria. C IF

BROWN (H W) The Problem of Malaria Mortality—*Amer J Public Health* 1940 Oct Vol 30 No. 10 pp 1190-1205 With 1 fig

Malaria is certified as the cause of from 2 500 to 4 500 deaths a year in the United States. With the object of obtaining information regarding the circumstances in which these deaths occur the author sent questionnaires to Georgia physicians who certified malaria as the cause of death of patients during the summer and autumn of 1937. Information concerning 101 such patients was obtained. 53 white and 48 coloured. The greatest number of deaths occurred in children under 5 years and in adults past middle age. The lowest number in the 5 to 9 and 10 to 14 age groups. Half the whites and three-quarters of the negroes had been ill a week or longer before seeking medical aid. Ten per cent died the day the physician was first called, and 28 per cent died within the next two days. Thirty four per cent of the first two days of illness. Sixty-seven per cent of these patients took some form of anti malaria treatment before calling a doctor. Fourteen persons died a month or longer after seeking medical advice. Quinine was the doctor's drug of first choice in treating these patients. Atabrin came next. Forty per cent did not receive what international authority considers to be adequate treatment to control a severe attack of malaria. Blood smears were made in only 52 of the 101 cases. Parasites were found in 47. *P. falciparum* was found in 23 films. *P. vivax* in 20 both together in one. *P. malariae* in two and an unspecified parasite in one. The large proportion of *P. vivax* infections probably indicates diagnostic error since *P. vivax* seldom causes death except in the very young or old.

Further education of members of the medical profession in the diagnosis and treatment of malaria is necessary and further facilities should be provided for the expert examination of blood films.

Norman White

PIVOTTI (Mário) O problema da malária do Brasil e a sua invasão pelo *A. gambiae* [Problem of Malaria in Brazil and the Invasion of Brazil by *A. gambiae*].—*Arquivos de Higiene* Rio de Janeiro 1940 June. Vol. 10 No 1 pp 127-160 With 10 figs & 1 graph

Malaria is an important cause of morbidity in Brazil. Only one of the 21 States Rio Grande do Sul, appears to be free from the disease. It is estimated that nearly a third of the rural population of 27 000 000 are infected. As a cause of mortality malaria is surpassed only by tuberculosis and intestinal diseases. The author describes the topography and the health conditions of the *Baía da Fluminense* an area of some 17 000 square kilometres in the Paraíba Valley, including the eastern and part of the southern coastal areas of the State of Rio de Janeiro. An account is given of the large amount of sanitary engineering that has been carried out during recent years and the results

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achieved thereby. Fifteen species of anophelines have been found the most important vector is *A. albatus*. *A. darlingi*, *A. argyritarsis* and *A. termisulatus* likewise transmit the disease. With regard to the introduction of *A. gambiae* into Brazil from Africa no original observations are recorded, but the considerable literature on this important subject is summarized and discussed.

N IV

GILL (C A) The Influence of Malaria on Natality with Special Reference to Ceylon.—*Jl Malaria Inst of India* 1940 Sept. Vol. 3 Nos 2 & 3 pp 201-252 With 2 maps & 8 graphs. [14 refs]

This is an epidemiological and statistical investigation into the effects of endemic and epidemic malaria on natality. Under the term natality, the author includes not only live births but stillbirths, miscarriages and abortions or missed births as well. He also takes count of missed conceptions. There are very few tropical or subtropical countries in which the recording of vital and demographic statistics is sufficiently complete to serve as the basis of an investigation of this nature. Ceylon appears to be an exception and for the period 1921-1930. In 1921 and 1922 the spleen rate of all accessible towns and villages in the island was determined on the basis of this survey, the island can be divided into five well-defined zones according to the intensity of endemic malaria prevailing therein. These malarial zones are those in which the spleen rate varied from 0-5 5-10 10-40 40-60 and above 60 per cent respectively. The vital statistics of these zones are compared corrections being made for variations in the age and sex distribution of the populations. The death rates and the infant mortality rates appear to reflect the baneful effects of malaria. It appears that endemic and hyperendemic malaria exercise no appreciable influence on the birth rate of the indigenous population. Epidemic malaria causes a change in the monthly distribution of births the amplitude of which varies with the intensity of the malaria. Epidemic malaria causes a temporary reduction of the birth-rate in proportion to its intensity and a temporary change in the monthly distribution of births. Endemic and epidemic malaria increase the frequency of stillbirths and missed births. It is inferred that high degrees of immunity confer partial protection against these accidents of pregnancy. These are some of the chief conclusions of an investigation that does not lend itself readily to summary.

V IV

GUYDA REPORT OF THE KING INSTITUTE FOR YEAR ENDING 30TH SEPT 1939 pp 45-48—Malaria Investigation—King Institute [Russell (Paul F)]

The malaria research activities of the King Institute Madras, are financed by the Rockefeller Foundation and are under the direction of P F Russell. The field investigations of medical, entomological, agricultural and engineering problems of malaria have been carried out in the Pattinikottai taluk Tanjore Southern Madras. The results of many of these enquiries have been published in the *Journal of the Malaria Institute of India* and have been summarized in this Bulletin.

N II

BOYD (Mark F) Observations on Naturally and Artificially Induced Quartan Malaria.—*Amer J Trop Med* 1940 Nov Vol 20 No 6 pp 749-798 With 5 figs.

This paper contains a very comprehensive analysis of observations made on 43 patients subjected to malaria therapy with *P. malariae*. Three strains of the parasite were used they came from widely separated localities but no observations were made to determine their antigenic relationship. In five patients infection was naturally induced in 43 patients trophozoites were inoculated intravenously. In naturally inoculated cases the incubation period varied between 4 and 5 weeks parasites were detected in the blood from three to twelve days before the clinical onset. In artificially induced infections the mean interval between inoculation and the first detection of parasites was 9.5 days and between inoculation and the clinical onset 19.2 days. The mean duration of naturally induced attacks regardless of therapeutic interference was 132 days and of artificially induced attacks 92 days. Early paroxysms were always simple quartan in type double quartans and quotidian fevers were only seen in advanced stages of the attack. An onset with remittent fever was rarely seen. Paroxysms after artificial inoculation show greater complexity and irregularity than those following natural infections. The parasite densities observed were considerably lower than those commonly observed in *P. falciparum* and *P. vivax* infections. In one very exceptional case of the series however a parasite density as high as 114 000 per cmm. was observed on one occasion. This patient died, apparently of malaria in spite of heavy doses of quinine. In the two other cases that terminated fatally malaria does not appear to have been responsible for death. But little justice can be done to this exhaustive study within the scope of a summary.

i. DULANEY (Anna Dean) & STRATMAN THOMAS (Warren K.) Complement Fixation in Human Malaria. I. Results obtained with Various Antigens.—*J Immunology* 1940 Sept Vol 39 No 3 pp 247-255 With 1 fig.

ii. STRATMAN THOMAS (Warren K.) & DULANEY (Anna Dean) Complement Fixation in Human Malaria. II. Diagnostic Application.—*Ibid* pp 257-264

i. By means of an antigen prepared from *Plasmodium knowlesi* parasites collected by centrifugation from laked red blood corpuscles of infected monkeys complement fixation tests have been carried out. The parasites washed free of haemoglobin, are dried *in vacuo* and ground to powder in a mortar. For use 0.1 gm. of the powder is ground in a mortar with 10 cc of saline. The solution is then frozen and thawed four times with a dry ice-alcohol mixture. The liquid is then centrifuged the supernatant fluid being standardized against known positive and negative malarial sera and tested for anticomplementary properties. Similar antigens have been prepared from *P. vivax* and *P. malariae*. With these antigens strong complement fixation was obtained with sera from cases of any of the three malarial infections. The reaction is thus a group rather than a specific one. Pre-existing syphilis has not been found to modify the reaction. A Wassermann negative patient may still give a negative Wassermann reaction at a

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time when malarial parasites are present in his blood and a 4+ malarial complement fixation has been obtained. Attempts to obtain cutaneous or precipitative reactions specific for malaria were not successful, nor did antigens prepared by other methods yield as definite results as the one employed.

In the second paper it is shown that complement fixation tests in malaria are very closely correlated with the presence of malarial parasites in the peripheral blood. A strongly positive reaction means the presence or recent presence of parasites in the blood. A negative reaction cannot however be taken as a certain indication of the absence of parasites. With increase in the number of parasites in the blood the intensity of the reaction increases also. From the standpoint of diagnosis the reaction might be of value in *P. falciparum* infection when parasites though present in the body are absent from the peripheral blood.

DULANEY (Anna Dean) & STRATHAN THOMAS (Walter K.) Specific Nature of Complement Fixing Antibody in Malaria as demonstrated by Absorption Tests.—*Proc Soc Experim Biol & Med* 1940. June Vol 44 No 2 pp 347-349.

The authors have confirmed the results of COGGESHALL and EATON that a specific complement fixation reaction in malaria employing *Plasmodium knowlesi* antigen can be obtained. A positive reaction is correlated with the presence or recent presence of demonstrable parasites in the blood. It has also been shown that Wassermann negative patients who receive induced malarial infections remain Wassermann negative though they become malaria positive. Absorption experiments carried out on bloods which are both Wassermann and malaria positive indicate that each reaction depends upon distinct and correlated antigens.

TALLAFERRA (William H) & KLÖVER (Cecilia) The Hematology of Malaria (*Plasmodium brasilianum*) in Panamanian Monkeys. 1 Numerical Changes in Leucocytes.—*J Infect Dis* 1940 Sept-Oct Vol 67 No 2 pp 121-161 With 9 figs. [101 refs]

— & — The Hematology of Malaria (*Plasmodium brasilianum*) in Panamanian Monkeys. 2. Morphology of Leucocytes and Origin of Monocytes and Macrophages.—*Ibid* pp 162-178. With 2 coloured plates [22 refs.]

These papers describe observations on the blood cells of a number of Central American monkeys both before and after infection with *Plasmodium brasilianum* a parasite with a quartan periodicity. The cells were studied from the point of view of quantitative as well as qualitative changes while the sacrifice of a number of the animals at selected stages of their malarial infections enabled the changes in the blood to be compared with those in the spleen, liver and bone marrow. In two coloured plates the various cells as seen in the blood and in the organs are depicted. The general results of this study are in agreement with those of previous investigations. They afford further evidence in support of the view that the lymphoid hyperplasia in malaria represents the mesenchymal reserve from which monocytes and newly formed macrophages arise.

C M W

HUFF (Clay G) Quantitative Studies on Size Variability, and Growth Rates of Oöcysts of Different Strains of Avian Malaria.—*Amer J Hyg* 1940 Nov Vol. 32, No 3 Sect C pp 71-80
With 2 figs [15 refs]

The author describes observations on the infectiveness and rate and extent of growth of oöcysts in mosquitoes (*Culex pipiens*) of two strains of *Plasmodium cathemerium* and one of *P. relictum*. One strain of *P. cathemerium* differed from the other in its greater infectiveness for mosquitoes and in the greater maximum size of the oöcysts. There were significant differences in size of the oöcysts in any individual mosquito but these were not so great as those in different mosquitoes. The rate of growth of oöcysts decreases progressively as they approach their maximum size.

SHORTT (H. E) MENON (K. P) & IYER (P. V. Seetharama) The Form of *Plasmodium gallinaceum* Present in the Incubation Period of the Infection.—*Indian J Med Res* 1940 July Vol. 28 No 1 pp 273-276

The authors have attempted to obtain evidence that the exoerythrocytic schizonts in the fowl malarial parasite *Plasmodium gallinaceum* are the forms which develop directly from sporozoites by inoculating with sporozoites very young chicks or chicks still within the egg. Sporozoites from the salivary glands of mosquitoes were deposited on the chorio-allantoic membrane of a 13-day-old chick embryo. Eleven days later the chick had made a hole in the eggshell but had failed to escape. It was found to be dead. On examination a very intense infection of the brain capillaries with exoerythrocytic schizonts was found. Smears of the heart blood showed only a moderate infection of red blood corpuscles with pigmented parasites. In a second experiment sporozoites were inoculated intramuscularly into a three weeks-old chick. Seven days later the chick was sacrificed. It was found to be in very much the same condition as the first chick except that the erythrocytic forms in smears of heart blood were too young to show pigment. As in the case of the first chick the extent of the brain infection with exoerythrocytic forms must have been the result of several days' development. In a third experiment a chick about three weeks old was inoculated intramuscularly with sporozoites. Six days later it was sacrificed. Only a scanty infection of the brain with exoerythrocytic schizonts was found while no erythrocytic forms could be found in the blood. The same result was obtained when the experiment was repeated. The authors interpret these results as follows. The sporozoites enter the blood and are taken up by or actively enter the endothelial cells lining the blood capillaries and other endothelial cells. They multiply by schizogony and increase in number till merozoites enter red blood corpuscles to become the pigmented forms. The exoerythrocytic schizogony continues as a low-grade infection which is not visually detectable till it is stimulated to further development and causes a relapse of the pigmented blood forms. It has generally been assumed that malaria persists as a low grade infection with pigmented forms but the authors think that such an assumption is unnecessary. It may be merozoites from exoerythrocytic schizonts which are responsible for cases of malarial infection in which gametocytes are the only blood forms present. It is perhaps of interest to note that the strain of *P. gallinaceum* used is not the one

[July 1941]

brought to Europe by BRUMPT and now distributed in many laboratories but another one from the same source in Ceylon which was sent to Gulindy Madras where the work was carried out. C M IV

LUMSDEN (W H R) & BERTRAM (D S) Observations on the Biology of *Plasmodium gallinaceum* Brumpt, 1933, In the Domestic Fowl, with Special Reference to the Production of Gametocytes and their Development in *Aedes aegypti* (L.).—Ann Trop Med & Parasit [28 refs] 1940 Sept 26 Vol 34 No 2 pp 135-160 With 6 figs.

The authors have studied *Plasmodium gallinaceum* as it develops in 12-16-weeks-old fowls infected either by intramuscular or intravenous inoculations of blood or by the bites of infected *Aedes aegypti*. This has involved daily observations on the blood in order to determine the average length of the incubation or prepatent period, the intensity of the infections, the variations in ratio of asexual to sexual forms, the periodicity of the asexual cycle and the number of gametocytes present and their infectivity to mosquitoes as judged by the number of oocysts developing on the stomach. The observation of GILMAN OLA that the asexual cycle is one of 36 hours was confirmed. It was noted that gametocytes occurring at midnight and midday alternately, at the commencement of the patent period, when asexual forms first became evident. The results obtained are compared with those of other observers on other species of malarial parasite. For a complete comprehension of the subject the paper is one which must be read in its entirety. C M IV

To (Somen) & Cho (Shoren) Vergleichende Untersuchung ueber die Wirkung der Chininalkaloide und deren Hydro-Derivate auf die Malaria des Vogels [Comparison of the Action of the Cinchona Alkaloids and their Hydro-Derivatives on Bird Malaria].—Tansan Igokai Zasshi (Jl Med Assoc Formosa) 1940 Aug Vol 39 No 8 In Japanese pp 1378-1391 [10 refs] German summary pp 1391-1393

The authors have investigated the toxicity and plasmodioid activity of quinine, quinidine and cinchonine and their corresponding hydro-derivatives on bird malaria. Though the hydro-derivatives are more toxic than the basic substances they are therapeutically effective at half their lethal doses. It is concluded that the hydro-derivatives being effective in doses so far removed from the lethal dose should be more useful for the treatment of malaria than the basic substances themselves. Investigations carried out by BUTLER HENRY and TREMAN (1934) gave results which do not agree with those recorded in the paper reviewed (this Bulletin 1934 Vol 31 p 600.) C M II

LUMSDEN (W H R) & BERTRAM (D S) The Effect of Plasmoquine and of Praequine on the Subsequent Development of the Gametocytes of *Plasmodium gallinaceum* Brumpt, 1933, In *Aedes aegypti* (L.).—Ann Trop Med & Parasit 1940 Sept 26 Vol 34 No 2 pp 161-172 With 3 figs [19 refs]

Experiments are described in which the influence of plasmoquine and praequine (the French equivalent of plasmoquine) have been

tested on gametocytes of *Plasmodium gallinaceum*. Fowls were infected by mosquito bites and when parasites appeared in the blood single doses of one or other drug were given by oesophageal tube into the crop. The infectivity of the gametocytes to mosquitoes (*Aedes aegypti*) was tested by feeding mosquitoes on the fowls at varying intervals of time. A dose of plasmoquine of 15 mgm. per kilo of body weight produced rapid diminution of the general infection, which persisted however for five days. No mosquitoes were infected after 46 hours from the dose. In a dose of 2.6 mgm. per kilo plasmoquine has no obvious effect on the general infection but mosquitoes fed 4 and 22 hours after the dose failed to become infected. Plasmoquine and praequine in a dose of 1.4 mgm. per kilo orally had no effect on the general infection while mosquitoes were still infected after 12 hours. Both these drugs in a dose of 0.14 mgm. had no effect on the general infection while massive infections were still produced in mosquitoes 16 hours after the administration of the drugs. There appears to be no difference in the action of the two drugs.

C M IV

AFRICA (Candido M.) DY (Francisco J.) & SORIANO (Lily J.) Studies on the Effect of Prontosil on Avian Malaria—a Preliminary Report—*Acta Med Philippina* Manila. 1939 July-Sept. Vol. 1 No 1 pp 19-28.

The authors have treated bird malaria (*Plasmodium relictum* in *Padda oryzivora*) by a varying number of intramuscular injections of prontosil. In nine birds which survived the treatment all parasites disappeared from the blood at the end of the course whereas in a number of control untreated birds the parasites persisted.

C M IV

MISCELLANEOUS

MANSON BAHR (Philip) The Prevalent Diseases of Libya.—*Lancet* 1941 Feb 22. pp 253-255 With 3 figs. [13 refs.]

This paper cannot be abstracted but attention is drawn to it here on account of its value to those who may find themselves in N. Africa. The prevalent diseases are mentioned and the author gives not only the findings of other workers but also the results of his own extensive observations on these conditions as they affected troops in N. Africa during the last war, laying stress not so much on the classical appearances as on those features which might confuse medical officers not accustomed to dealing with the disease in question. He deals with malaria especially subtertian which is prevalent in the Fezzan, leishmaniasis, relapsing fever, typhus, sandfly and dengue fevers, deficiency diseases, dysentery, helminthic diseases, venereal diseases and desert sore. The common venomous animals are referred to. Modern lines of treatment are indicated. The paper is concise but is full of essential information. It should be available for reference to every medical officer working in N. Africa.

C IV

SMITHBURY (K. C.) MAHAFFY (A. F.) & PAUL (J. H.)
and its Causative Virus.—*Amer J Trop Med* 1941 Jan.
Vol. 21 No. 1 pp 75-90

This is the second virus discovered in Uganda in the course of attempts to isolate the yellow fever virus by the group of workers from the Rockefeller Foundation. The fever occurred in a group of labourers constructing a road through Bwamba county which is approximately 18 miles long by 9 miles wide and is in the western Province of Uganda. The main clinical features of the disease were sudden onset of fever, headache and backache which lasted 5 to 7 days. Convalescence was rapid and complete with no fatal cases seen. The virus was isolated from the blood of nine such cases by intracerebral inoculation. The virus caused illness or death when inoculated intracerebrally or intranasally in mice, a fever only when inoculated intracerebrally in monkeys and no febrile or clinical reaction in guinea-pigs. The lesions produced in mice were limited to the nervous system and by the appearance of intranuclear acidophilic bodies resembling inclusion. Filtration experiments indicate that the virus approximates 113 to 150 mμ. The serum of convalescent human beings, mice, monkeys and guinea-pigs all contain neutralizing antibodies to the virus.

EARLE (A. Vigors) Whale Oil as a Local Application in Tropical Ulcer
—*J Trop Med & Hyg* 1941 Jan. 1 Vol. 44 No. 1
pp 1-2 F. O. MacCallum

Cod-liver oil as a topical application for the treatment of tropical ulcer has been favourably reported upon, the oil being applied under elastoplast. Its use has however the very serious drawback of producing an odour so disgusting that those in the neighbourhood cannot tolerate it. In 1934 DE DRIESBACH reported favourably on the use of whale oil for dressing burns, wounds, gangrene and the like adding that it suppressed the foul odours which often are associated with these conditions. The author has now used it for cases of tropical ulcer in procedure being as follows. The ulcer is first cleaned by several applications of CuSO_4 solution or of MgSO_4 and glycerin then an ointment of whale oil 30-40 per cent with vaseline 70-60 per cent is smeared on and the site bandaged with elastoplast. This is left untouched for 10-14 days during which the patient is instructed to rest. Details are given of four patients, with ulcers associated with Vincent's spirochaete in all of whom healing was complete in 3-4 weeks. All four were also given one of the sulphonamide group of drugs.

H. H. S.

LARKER (W. F.) Studies in Method and Standardisation of Blood Examination. VII. Blood Sedimentation Rate, Sedimentation Volume and Centrifuge Volume.—*Edinburgh Med J* 1941 Jan. Vol. 48 No. 1 pp 14-25

In these examinations the author uses common vaccine lymph of 1 mm. bore and points out that, within limits, the bore does not greatly influence the result, but that it is essential that

the bore should be uniform throughout each tube. The tubes are thrown away after use so that elaborate cleaning is dispensed with. Blood from a finger prick is satisfactory.

Technical details are given. 4 drops of blood are diluted with 1 drop of 3.8 per cent. citrate solution and this mixture is taken up into the tubes to a height of 5 cm. Sedimentation readings are taken at 20 minutes, 1 hour and 24 hours and after this the tubes are centrifuged and the height of the column of packed cells is measured. It was found that there was a fairly constant relation between the height of the column of red cells after sedimentation for 24 hours and the height after centrifugation. The factor was 0.75 which when multiplied by the former observation gave value of the latter. But these readings, of course are in blood diluted with citrate solution for undiluted blood allowance for the citrate must be made. Nevertheless the author considers that when a centrifuge is not available the height of the column of red cells after sedimentation for 24 hours adjusted by these calculations is a very useful substitute for the volume of packed red cells or for a red cell count. Dilution may be avoided by using dry powdered oxalate as anticoagulant. [The method may be most useful to workers in the tropics who find difficulty in obtaining laboratory services or who have not enough practice to undertake with certainty the skilled operation of blood counting.] C IV

LEDERER (Richard) A New Form of Acute Haemolytic Anaemia
"Baghdad Spring Anaemia. —*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol 34 No 5 pp 387-394

Cases of acute anaemia in children occur every year in Baghdad in spring and some are fatal. In April and May 1940 the author observed 14 cases of which one ended fatally. The onset is sudden with abdominal pains and vomiting. Pallor is immediate and conspicuous and jaundice follows in a few hours. After the first stage drowsiness occurs. In severe cases the condition assumes a dangerous appearance in 12 to 18 hours. The red cell count averages 1 000 000 and the white cell count from 18 000 to 45 000. The course is rapid in the fatal case death occurred in 36 hours and in those that were cured the anaemia recovered after two weeks. The condition suggested anaphylaxis and a detailed account is given of the investigation which confirmed the theory. Flowers (*Verbena Mathiola* and cornflower) seem the most likely agents. A similar condition called favismo has been described in Sicily and Southern Italy. All the cases were in boys and 13 of the 14 were Jews of a significant constitutional type. The treatment was by the administration of blood, liver extract and injection of adrenalin. W P Kennedy

WIGGLESWORTH (V B) The Sensory Physiology of the Human Louse
Pediculus humanus corporis de Geer (Anoplura) —*Parasitology*
1941 Mar Vol 33 No 1 pp 67-109 With 35 figs.
[41 refs]

This paper describes the sense organs of the louse the sensory responses and the mechanisms of orientation to various stimuli. The antennae bear tactile hairs, some thin walled cones at the apex

which are shown to be organs of smell and some delicate tufts shown to be humidity receptors. The temperature sense occurs on the antennae and elsewhere on the body. The structure of the eyes is described. The sensory responses are studied mainly by observing the track of the louse in an arena in which the two halves differ in a single stimulus at a time. Temperatures above or below 31–29°C. are avoided. High humidities are avoided—though this response is readily influenced by the experience of the louse in the immediate past, and by exposure to high humidities it may be caused to avoid low humidity almost any odorous chemical is repellent. Smooth materials are avoided if rough materials have been recently experienced. Light is avoided.

The response to light is mainly a "directed response" the louse is orientated toward an area of shade. The responses to temperature smell humidity and contact are mainly "undirected responses" when moving in a favourable zone the louse follows a straight course on entering an adverse zone (or a zone where some favourable stimulus recently experienced is absent) it follows a convoluted track. Thus the louse turning when the intensity of stimulus falls keeping straight while the stimulus remains constant or increases gradually finds its way to the centre of a favourable zone.

I. B. Wiglesworth.

KELSEY (A. J.) Larva Migrans or Myiasis Linearis treated by Diathermy—*Vol. 31 Australia*, 1940 Oct. 19 27th Year Vol. 2 No. 16 p. 379 With 2 figs.

Creeping eruption the condition due to *Larva migrans* has several causes among them the larval nematode of *Ancylostoma brasiliense* in Ceylon and S. Africa or a mite allied to *Tetranychus molestissimus*, in the Argentine and Uruguay. *Hypoderma* *Gastrophilus haemorrhoidalis* in Russia. *Linaria stenocephala* and *A. caninum* (experimentally in volunteers) as stated in Manson Bahr's *Manson's Tropical Diseases*. In the present case the actual cause is not stated, the interest of the record lying in the results of treatment. Hitherto treatment has not been very satisfactory. Injection of cocaine and parasiticide in front of the advancing larva may be quite ineffectual, ethyl acetate on collodion flexle may cure. Refrigeration with ethyl chloride gives better but not certain results. Carbon dioxide snow causes much pain, and may set up a secondary dermatitis, refractory to treatment. Localunction of oil of chenopodium has given good results in some cases.

The patient showed an extensive area of involvement—the back and front of the right shoulder and axilla—the condition had persisted for two months. The length of the burrows might run to 2 feet, and the rate of advance was about an inch daily. There was a pustular dermatitis from secondary infection due to irritation and scratching. Ethyl chloride was ineffectual. The author used the needle point of a diathermy apparatus with a 1/16 inch spark and if the spark was directed to the right spot relief was immediate. There were some 25 burrows and probably more. Treatment was given for seven days, and, judging by photographs showing the condition on the second and eighth days of treatment, the result left nothing to be desired. [See also this *Bulletin* 1940 Vol. 37 p. 534]

"I. S.

COTTERELL (G S) Preliminary Investigations on the Fly Population of Stable Manure Heaps and Measures for the Prevention of Breeding.—*Pap 3rd IV Afr Agric Conf Nigeria June 1938 Sect Gold Coast Lagos* [1940] Vol 1 pp 118-125 With 2 plates [Summarized in *Rev Applied Entom Ser B* 1941 Mar Vol 29 Pt 3 pp 46-47]

As mixed farming including the keeping of cattle is being advocated in the Gold Coast experiments were carried out to ascertain to what degree Muscoid flies breed in manure heaps and in which parts of the heaps breeding occurs the effects of fermentation, and the extent to which breeding might take place in droppings in the field. Nearly all the Muscoids found were *Musca domestica* L. or other Muscids most of which it is thought will prove to be small examples of this species, which are often bred from drying material and cannot reproduce. An investigation of an old existing dump consisting chiefly of horse manure and bedding stacked on a concrete floor and surrounded by concrete walls on three sides showed that breeding of *M. domestica* was inhibited where the temperature of the manure was high owing to fermentation, and occurred chiefly in the surface layers. It also appeared that larvae were constantly being added to the heap with fresh manure. As this dump was not considered typical further observations were made on a heap of cattle manure stacked on a beaten earth floor under cover and prepared over a period of three weeks. All but one of the 184 larvae and pupae taken in it were in the surface samples which were taken from a depth of 3 ins. only and in which the temperature was less than 50°C [122°F]. It was also shown that the larvae could pupate successfully in the hard beaten earth under and particularly at the immediate edge of the heap. Extensive breeding was found to take place in the field in cattle dung 1-3 days old and a certain amount in dung less than 24 hours old. More flies were produced per cubic foot from dung 1-3 days old than in any part of the dung heap under observation. Two experiments were carried out to test the possibility of flies breeding in heaps of cattle dung in which fermentation is complete. The heaps were caged for 18 or 19 days to allow flies to emerge they were then re-exposed for 5 days after which they were caged again and emergence once more observed. In one experiment 276 Muscids emerged during the first period and 282 during the second but in the other only one fly (*Stomoxys* sp.) appeared during the second period, though 583 Muscids emerged during the first.

Previous workers have ascertained that house-flies cannot live in manure with a temperature of 114.8°F. In the present observations temperatures as low as this were recorded only in the immediate surface layer and in manure in which fermentation was complete. It is therefore suggested that breeding may be restricted to some extent if the depth of the cooler surface layer is reduced by close packing each time fresh manure is added. In dry weather it may be necessary to sprinkle a little water on the heap before it is beaten down. Breeding can also be considerably reduced by covering heaps with oiled Hessian cloth. In an experiment with two identical heaps the covered and uncovered ones produced respectively 66 and 276 flies. To prevent infestation of dwelling houses, cattle should not be allowed to graze within 700-800 yards of them unless all dung is collected daily.

LEXXOX (F. G.) & WEBBER (L. G.) Studies of the Physiology and Toxicology of Blowflies. 3. The Toxicity of Some Arsenicals to Larvae of *Lucilia cuprina*.—Commonwealth of Australia. Council for Scientific and Industrial Research. Pamphlet No 101 Melbourne. 1940 pp 51-67 With 1 fig. [15 refs.]

By incorporating several well-known arsenicals in a synthetic medium and feeding them to *L. cuprina* larvae their relative toxicities to this organism were assessed. As a measure of toxicity the percentage mortality was recorded for each poison at frequent intervals during the course of the experiment and, from the resultant time-mortality curves, times for 50 per cent mortality were read.

Although the compounds were compared both at equal percentage concentrations and at equivalent arsenic concentrations there was no major difference between the relative order within the two series. Thus it was not possible to correlate the toxicity of a compound with its total arsenic content. However there was some correlation between toxicity and arsenic dissolved by the enriched medium.

"The results show that the arsenicals could be subdivided into two groups. Firstly the highly toxic compounds comprising, in order of decreasing toxicity, barium arsenite, calcium arsenite, arsenic acid, Paris green, and arsenous oxide; and secondly the moderately toxic arsenates of zinc, aluminium, lead and calcium.

"The absence of pigment from the crops or guts of larvae on stained enriched medium containing toxic concentrations of sodium or calcium arsenite is taken to indicate that these arsenicals may not destroy the larvae through absorption of arsenic from the gut.

LEXXOX (F. G.) Studies of the Physiology and Toxicology of Blowflies. 4. The Action of Contact Larvicides on *Lucilia cuprina*.—Commonwealth of Australia. Council for Scientific and Industrial Research. Pamphlet No 101 Melbourne 1940 pp 69-131 With 18 figs. 65 refs.

A method is described for measuring the contact toxicities of liquids to *L. cuprina* larvae by totally immersing a constant number of prepupae in the test liquid under standard conditions and determining the percentage which is unable to complete metamorphosis.

"Using this method the influence of concentration, time of contact, and temperature on the toxicity of a poison are studied. The concentration-mortality curves for acetone, ethyl acetate and acetic acid, each diluted with water, methyl alcohol, and ethyl alcohol, show that the steep inflexion of the typical sigmoid curve is displaced towards the less toxic component by increase in toxicity of either component.

Owing to the difficulty of administering very small doses of the undiluted liquids, the time-mortality curves rise sharply during the first few minutes and this rise becomes more acute with increase in the toxicity of the test liquid. In fact substitution of a highly toxic for a slightly toxic liquid increases in the concentration of acetic acid, or increase in the temperature of acetone diminishes the length of the initial horizontal portion of the sigmoid curve.

"A semi-logarithmic relationship exists between the time for 50 per cent mortality of *L. cuprina* and the concentration of acetic acid or the temperature of acetone. Calculation of the temperature coefficients for acetone gives values of the same order of magnitude as previously recorded for the action of various chemicals on bacteria.

A type of drug antagonism which operates when small amounts of toxic liquids are added to practically non toxic liquids is noticeable particularly when inhibition of pupation rather than fly emergence is used to measure mortality. The choice of one or other of these two criteria may have a considerable influence on the apparent relative toxicities of two compounds because they do not always bear the same constant relationship to each other.

The contact toxicities of hydrochloric acid and sodium hydroxide are approximately equal and greater than those of weaker acid and alkali. It is highly probable that the toxicities of inorganic acids and alkalis are a direct function of their hydrogen ion and hydroxyl ion concentrations respectively.

Measurements of the toxicities of a wide variety of pure liquid organic chemicals show that aliphatic halogenated and aromatic hydrocarbons are exceptionally potent and in the normal aliphatic alcohols or fatty acids toxicity increases as the carbon chain lengthens within the homologous series. Isomers of alcohols or acids are less toxic than the corresponding normal compounds. Aqueous solutions of the free base nicotine are considerably more toxic than solutions containing nicotine as sulphate. Amongst the most toxic of the essential oils are caraway dill mustard origani and thyme. Tests with coal tar fractions show that their toxicities increase with volatility and tar acid content. Lipoid solvents are exceptionally toxic to *L. cuprina* and it is considered that they act by dissolving the outermost cuticular layer thereby facilitating penetration of the cuticle.

ROY (A. C.) MAXUMDAR (D. C.) & MUKHERJEE (P) The Anti-Haemolytic Action of 'Soluseptasine' a Drug belonging to the Sulphanilamide Group—*Indian Jl Med Res* 1940 July Vol 28. No 1 pp 235-240

The mode of action of drugs of the sulphanilamide group is still obscure and the authors who have been investigating the haemolytic properties of certain substances, have tested the effect of a drug of this group on the haemolytic power of cobra venom bile salts saponin cyclamin and of the supernatant fluid from centrifuged 18-hour fluid cultures of the El Tor vibrio and a haemolytic streptococcus. On the haemolytic action of all these soluseptasine was found to have a definite retarding action. On sodium oleate the action was irregular. Protocols of the controlled experiments are given but cannot be reproduced in detail here.

C W

DE WAAL (H. L.) South African Senecio Alkaloids. [Correspondence]—*Nature* 1940 Dec. 14 Vol. 146 No. 3711 pp 777-778. [Summary appears also in *Bulletin of Hygiene*]

From *Senecio retrorsus* the alkaloid retrorsine has been isolated. It has the formula $C_{14}H_{25}O_4N$. The author has also isolated isatidine $C_{14}H_{23}O_4N$ and another alkaloid whose formula may be $C_{14}H_{25}O_4N$. Both the latter are soluble in water but not in chloroform. From *Senecio rosmarinifolius* a new alkaloid rosmarinine has been isolated with formula $C_{14}H_{27}O_6$ and on hydrolysis yields senecic acid and a base rosmarinine. *Senecio pterophorus* contains retrorsine and a new alkaloid pterophorine $C_{14}H_{23}O_4N$.

In the bread poisoning which affects human beings in the Cape south western districts of South Africa it is the *Senecio ilicifolius*

which is responsible. This contains the above-mentioned retrovirus and pterophine and a third alkaloid, seneciionine. A fuller report on the investigation is to appear later [Senecio poisoning was first described in South Africa in 1918. See *Bull. of Hyg.* 1936 Vol. 11 p. 849 1937 Vol. 12, p. 898 and this *Bulletin* 1921 Vol. 17 pp. 250-252] H H S

DOBELL (Clifford) Researches on the Intestinal Protozoa of Monkeys and Man. I. The Life-History of *Dientamoeba fragilis* Observations, Experiments, and Speculations.—*Parasitology* 1940 Nov. Vol. 32. No. 4 pp. 417-461 With 65 figs on 2 plates & 1 text fig. [86 refs.]

Thus the tenth contribution by the author on the subject of the intestinal protozoa of monkeys and man, deals with that enigmatic amoeba *Dientamoeba fragilis* which was first described by him and Miss JERRA in 1918. Since the original account the amoeba has been discovered in man in all parts of the world and, in addition, by certain observers in monkeys. The author has studied several strains of the amoeba in cultures and these have shown him that the forms which were first described from faeces must have been degenerate so that he was misled as to the correct structure. The culture forms can be observed and prepared without any changes of temperature or exposure to unfavourable conditions and it is on these that the present corrected description is based. Several remarkable facts have come to light. In the first place the binucleate condition of the amoeba, in which it is most commonly seen both in faeces and in cultures, is due to an arrest of the nuclear division process in the telophase of mitosis, so that in each half of the dividing nucleus which retains the nuclear membrane are a series of chromosomes. There are usually six of these and one is larger than the others. Furthermore the two nuclei are connected by a thread a centrodesmus (the author prefers this spelling to the more usual centrodesmose) at the point of attachment of which a minute granule is sometimes visible. The author points out that the whole of this arrangement is reminiscent of a flagellate rather than an amoeba and that *D. fragilis* bears a close resemblance to *Histomonas meleagridis* the cause of blackhead in turkeys, which lives as a flagellate in the caecum of the fowl but which can invade the caecal thomies and liver of turkeys where it is in an aflagellate amoeboid stage. The division stages of *H. meleagridis* are strikingly like those of *D. fragilis* in fact the two organisms resemble one another very closely except that the one in certain stages possesses a flagellum while the other so far as present observations go never does. It is known that transmission of *H. meleagridis* from host to host is effected by the eggs of an intestinal worm (*Heterakis papillosa*) and it is tentatively suggested that the human parasite *Trichuris trichiura* might play a similar part in the case of *D. fragilis*. In favour of some such method of transmission is the complete absence of encysted stages. Attempts to transmit *D. fragilis* to man and to two macaques *per os* and to the monkey *per anum* failed. A number of chicks were inoculated *per anum* but only in one case was a transitory infection of one week's duration obtained.

The paper like others of the series contains a mass of information and detail about the amoeba, if indeed it is an amoeba, the methods of its culture its habits and structure while three plates, executed with the author's well-known skill, illustrate all that is known of the

amoeba morphology and certain features for purposes of comparison
of *H. meleagridis* C M Wenyon

MASON (Eleanor D) The Effect of Change of Residence from Temperate to Tropical Climate on the Basal Metabolism, Weight, Pulse Rate Blood Pressure, and Mouth Temperature of 21 English and American Women.—*Amer J Trop Med* 1940 Sept. Vol 20 No 5 pp 669-686 With 6 figs

Measurements have been made under basal conditions of weight pulse blood pressure mouth temperature and metabolism of twelve English and American women changing their residence from temperate to tropical climates (South India) These data are analyzed and compared with a similar study of nine women reported in 1934 For one subject records are charted covering a period of twelve years including three furlough periods in America and two 5-year periods in Madras

The results found in this series of twelve are consistent with those in the 1934 series From the combined study of 21 women in the basal state the following conclusions may be drawn —

- 1 The weight tends to decrease in the tropics.
- 2 The pulse rate falls in the tropics.
- 3 There is a trend toward slightly lowered systolic and diastolic pressures but much individual variation
- 4 The mouth temperature either shows no significant change or rises in the tropics. The average for the whole series is a rise of 0.3°F
- 5 With regard to basal metabolism two sharply marked types of behaviour appear with the change to tropical climate Eight or 38 per cent of these 21 women showed no significant change in metabolism Thirteen or 62 per cent showed a distinct fall in metabolic rate in the tropics averaging approximately 10 per cent This change when it occurs takes place promptly i.e. within the time required for the journey and in those few cases studied for longer periods the behaviour has been consistent in the same individuals. It occurs in both newcomers and old residents When this type of person returns to temperate climates the rate of metabolism rises to its former level again promptly
- 6 The data suggest strongly a relation between body temperature and metabolic response to the tropics. Both series show a greater rise in temperature in the tropics in those women whose metabolism does not change Both series also suggest that persons of this type with constant metabolism but rising temperature are more likely to have been persons with low body temperatures in temperate climates Apart from this possible factor there appears to be no way of predicting from measurements in temperate climates which type of tropical response an individual will show
- 7 There is as yet no real evidence that one type of tropical response is a better adaptation than the other

MORTOULLE (Léopold) Medical Aspects of the Protection of Indigenous Workers in Colonies.—*Internat Labour Rev* 1940 Apr Vol 41 No 4 pp 381-370

REED (Alfred C) The Future of Tropical Medicine.—*Amer J Trop Med* 1940 Jan. Vol 20 No 1 pp 1-11 [10 refs.]

REVIEWS AND NOTICES.

CAMEROX (Thomas W M) [Professor of Parasitology McGill University etc.] *The Parasites of Man in Temperate Climates.*—pp xi+182. With 61 illustrations 1940 Toronto Canada The University of Toronto Press. [\$3 00.]

The purpose of this book is clearly defined in the preface "It is intended for the medical man who practices in the English-speaking temperate and sub-tropical zones. Only parasites which actually occur in North America or Great Britain are discussed in detail." The book is not intended for students of tropical medicine. The first part deals with protozoa. Of the intestinal protozoa *Entamoeba histolytica* is naturally given prominence, and it is adequately described, with information as to the mode of transmission, pathological effects and treatment. The combined treatment of amoebiasis with emetine bismuth iodide and vatren, however is not mentioned. Vatren is described as the drug of choice but emetine hydrochloride may be used if the liver is invaded or if there is severe abdominal distress. The other intestinal protozoa are adequately described and illustrated in beautifully prepared drawings. Of the trypanosomes only *T. cruzi* is described, but the malaria parasites receive considerable attention.

The parasitic worms are dealt with much more fully. They are described in detail and the transmission of infection, pathological effects, treatment and control are dealt with. Emphasis is placed on Trichinella, the hookworms, the cercariae causing swimmers' itch, and Echinococcus, but a number of other worms are described. Of the arthropods the mosquitoes of N. America receive prominence and of the Diptera the mosquitoes of N. America receive mention. The Simuliidae, Tabanidae and Muscidae especially those of importance in N. America, are described. Considerable attention is given to lice and fleas and their control, and a few pages are devoted to the bed bug.

Finally there is a short section on parasitoides and a longer one on technique.

The general tone of the book is dogmatic as it should be to fulfil the purpose for which it was written. It is clear and precise, with but little discussion of debatable points and is accurate. The illustrations are excellent throughout. The order in which the various parasites are dealt with is not always the order in which they are classed scientifically. This may not be of great importance but to the reviewer it seems probable that tables giving the scientific arrangement of the parasites by Phylum, Class, Order and so on with brief descriptions of the points of similarity or difference between the different generic groups, would make for clarity in the mind of a student. Otherwise the book is excellent for its purpose and can be confidently recommended for class work.

C IV

TROPICAL DISEASES
BULLETIN

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SUMMARY OF RECENT ABSTRACTS *

VII HELMINTHIASIS

General

Price

FAUST *et al* (p 62) have investigated the efficiency of 11 techniques for the demonstration of helminth eggs and protozoa in faeces. The details of these are given together with the results obtained, and the final recommendation of the authors is that for clinical laboratory work or in epidemiological surveys a combination of direct faecal smear with zinc sulphate direct centrifugal floatation is the most useful. The zinc sulphate solution employed is of specific gravity 1.180 and this is used with a 1 in 5 suspension of faeces in saline which has been sieved through a brass sieve of 40 meshes to the linear inch. In comment LANE points out that a strained suspension is not the equivalent of an unstrained one that enumeration of organisms should be used in the evaluation of techniques and criticizes the modified DCF process adopted by the authors. SWARTZWELDER (p 62) in comparing five methods for the demonstration of intestinal parasites concludes that a centrifugal floatation technique with zinc sulphate solution of specific gravity 1.180 gives the best results for both protozoa and helminth eggs. Lane points out that the technique used was not the standard DCF.

SAWITZ *et al* (p 62) have compared a direct centrifugal floatation method with the use of the N.I.H. swab for the diagnosis of Enterobius infections, and show that the latter method is much the more sensitive. They state however that at least seven swab examinations are necessary before the absence of infection can be regarded as certain.

LANE (p 477) discusses points raised in a consideration of the work of the New Orleans investigators referred to above. He shows that straining of an emulsion of faeces reduces the hookworm egg count to between 31 and 43 per cent of the number actually present and states that the stickiness of the eggs may to some extent account for this loss. In his experience the loss of eggs on straining far outweighs the advantage of a clearer preparation. Furthermore the

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

American workers repeatedly pour off supernatant fluid after centrifugation and Lane shows that this procedure may result in considerable loss of eggs. The specific gravity of the floating fluid should, for optimum results, vary with the type of egg investigated—for hookworm eggs 1.150 to 1.200 is effective, for *Ascaris* 1.300 should be used. He also points out that to avoid losing egg the coverslip to be examined should be removed from the tube by a rapid lift and that the coverslip should not be reversed, but should be examined as a hanging drop. These are some of the points emphasized in the original D.C.F. technique and the adaptations made by the American workers have probably rendered their technique less efficient than D.C.F. The author points out that a medical man is entitled to expect from a laboratory an estimate of the weight of infection, and he has used D.C.F. for this purpose. He does not consider the American techniques investigated to be as efficient as D.C.F. in this respect.

NITULESCO *et al.* (p. 65) have compared their modifications of the Willis-Hung and Telemann techniques. They propose to adopt the former in all research on helminth eggs in stools.

GIOVANOLA (p. 479) records the results of a survey in Sardinia in which Lane criticizes the technique used. NITULESCO (p. 65) reports on the worm infestations found near Jassy, Rumania. SESEKJI *et al.* (p. 479) have investigated the incidence of intestinal parasites in Irak. DE MEILLON and HOLLAND (p. 480) record helminthological findings in Zululand. *Ascaris* infection is the most common and the authors accept the view that air-borne infection is possible. JADIN and DELPERANGE (p. 480) report on intestinal parasites of men and animals at Coquilhatville, Belgian Congo. VOGEL and RIOT (p. 67) give a table of the principal helminth infections found during 1937 in the French colonies.

GRAM and FOLAN (p. 480) found a total *Enterobius* incidence of 12 per cent in 606 white and negro schoolboys in Washington examined by the anal swab technique and give the figures of faecal examinations for other worms. SMITH *et al.* (p. 478) report on a survey of intestinal parasites in Alabama. Hookworm infection was more prevalent in places with sandy soil than in those with clay. HOFFMAN and JAXER (p. 67) report on a parasite survey of Isabela, Porto Rico.

In many of these surveys of intestinal parasites the techniques used cannot, on the information given, be regarded as sufficiently sensitive to give an accurate picture of the real incidence of the worms. The surveys therefore lose much of their value for comparison between the various countries and, indeed, for the information desired. It is surely time for the *standardization of common standards* in the various countries if epidemiological work is to have its maximum value.)

In a discussion on anthelmintics, SMILLIE (p. 68) records his view that the ideal drug has not yet been found, and on account of the deaths which have occurred from the use of oil of chenopodium and of carbon tetrachloride, his advice is to use betabesortinol. SMETANA (p. 68) describes a condition of nephrosis due to poisoning with carbon tetrachloride. There may be oliguria or anuria, and nitrogen retention may occur. The urine contains albumin, red and white blood cells casts and bile. In fatal cases there may be central necrosis of the lobules of the liver and a tendency to bleeding is common.

HARR and DETTA (p. 69) conducted an experiment in which tetrachlorethylene (dose 4 cc.) was compared with a standard oil of chenopodium (dose 30 minims). Assessment of results was made by

the D.C.F. technique and it was found that the former drug cured 48.3 per cent. of infections while the latter cured only 4.8 per cent. Tetrachlorethylene is pleasant to take is cheap and has little toxic action.

SWALES (p. 69) has tested the action of phenothiazine in sheep. It is a highly efficient anthelmintic and is comparatively non-toxic. Its efficacy is increased by mixing bicarbonate of soda and tartaric acid into the bolus. The effervescence produced causes fine division and thus aids solution of the drug which is naturally rather insoluble. The dose used was 0.3 to 1.0 gm. for each pound of body weight.

CHANDLER (pp. 216-481) discusses local immunity in parasitic infections. In most intestinal helminth infections there are two phases: (1) a reaction to parenteral migration or mucosal burrowing of the larvae before they grow to maturity and (2) a reaction to the adult parasites in the intestine. Parenteral migration as in *Ascaris* and other infections stimulates a general immunity which is shared by the intestinal mucosa. The type of immune reaction to adult worms is largely influenced by their feeding habits—those which feed on mucosal tissue stimulate local immunity, those which feed on blood are not affected by this type of reaction but only by a general body immunity. In *Trichinella* infections there is local intestinal immunity which is highly protective and, later, parenteral immunity which is relatively feeble but which can be provoked by vaccination. The latter is manifested by eosinophilia and precipitins.

Trematodes

ALCAÏ *et al.* (p. 150) report on a focus of *S. haematobium* infection in Algeria. PALLARY (p. 485) attributes the absence of *Bulinus* and *Planorbis*, in collections of water south of Biskra, to excess of salts particularly of magnesium in those waters.

BARLOW (p. 485) shows that in Egypt the infestation rates of the snails *Planorbis boissyi* and *Bulinus truncatus* closely follow the temperature curve being highest in the months July to October. The diminished rates during winter are attributed to the Nile flood the cold season and the winter closure of water by the Irrigation Department.

MOZLEY (p. 483) states that *S. haematobium* is found throughout Tanganyika and Zanzibar and *S. mansoni* is widely spread on the mainland but not on the islands. Infection rates vary from 10 to 70 per cent. The intermediate host of *S. haematobium* is probably *Physopsis globosa* and that of *S. mansoni* is *Biomphalaria pfeifferi*. The undesirable snails are only found in a few of the many ponds, marshes, lakes and streams and they could in many cases be exterminated at small cost by draining, flushing, poisoning or the use of certain types of vegetation. He found *P. globosa* to be abundant where there was abundant growth of aquatic or semi-aquatic plants but where the surface of the water was completely covered by plant leaves the snails were few. The best plant to secure this effect appeared to be *Pistia stratiotes* but as Lane points out in comment this is the plant which at the other side of the Indian Ocean furnishes air for the larvae of species of *Mansonioides*, the vector of *Wuchereria malayi*. The author found several local plants to be useful in preparing

effective poisons, but the matter requires further study. He considers that combined measures would bring about the disappearance of the snails within a reasonable period.

VAN DEN BERGHE (p. 482) has investigated schistosomiasis in the Stanleyville province of the Belgian Congo. He considers that *Schistosoma intercalatum* should be regarded as a subspecies of *S. haematobium*. *S. mansoni* infection varies in Niangara the rate is 5 per cent according to hospital figures, but in one place near Lake Albert all the children examined showed eggs, while visceral infection with ascites was common. In Faradje, which is densely populated, hepatic cirrhosis with a state recalling that of infection with *S. japonicum* is frequently found. *Planorbis adowensis* is an intermediate host of *S. mansoni* in these regions. DARTVELDE (p. 150) found *Physopsis africana* in a focus of vesical schistosomiasis in the Belgian Congo but in a second focus the intermediate host was not found. GIOVANKOLA (pp. 150-485) states that the snail host of *S. mansoni* in Eritrea is *Planorbis rubellus* and in Harar *P. adowensis*.

SCOTT (p. 484) has investigated the epidemiology of *S. mansoni* infection in Venezuela. Here schistosomiasis is as severe as anywhere in the world, and in the lower valleys infection rates of 80 per cent for males and 60 per cent for females are recorded. The snails concerned are *Australorbis glabratus* and *A. olivaceus* (if the latter is a separate species) and they are usually found in irrigation canals where the current of water is sluggish. Control is possible by drainage and by the careful maintenance and reconstruction of canals, by intermittent use of canals and by efficient rural sanitation.

By making serial radiographs in Alexandria, MAINZER (p. 485) has shown that in infection with *S. mansoni* there is usually latent pulmonary involvement even in cases in which there are no clinical pulmonary symptoms and that it comes on about three months after infection. He describes the changes seen, which may consist of focal lesions increased striation or enlargement of the hilar shadows, and points out that antimony therapy is apparently without effect on the fever of the secondary stage and on the development of the pulmonary changes if the therapy is started at the onset of the secondary stage and if the usual doses are employed. MAINZER and KRAUSE (p. 487) give an account of the electrocardiographic changes occurring during treatment with tartar emetic. The extent of these changes was parallel to the degree of bradycardia due to the antimony and indicates the intoxication of the heart muscle caused by the drug which may not give rise to clinical signs but which may in exceptional circumstances result in sudden death through auricular fibrillation.

HOFF and SHAW (p. 147) describe four patients with schistosomiasis: one had myelitis and all had mental disturbance but these conditions cleared up on treatment with foudin or tartar emetic. BAYOUMI (p. 486) reports a case of myelitis in which calcified schistosome eggs were found in the spinal cord and nerve roots, and also in the urinary tract.

PAYATOTATOU (p. 486) reports two cases of urinary schistosomiasis cured with anthiomaline. SCHIARI (p. 150) reports on treatment of vesical schistosomiasis with stibonal and other drugs, including emetine hydrochloride.

SERIOLE (p. 148) has investigated the efficacy of chlormation in destroying schistosome cercariae in water especially in relation to Army water trucks. The chlormation was measured by the Horrocks

test (which is described in a footnote) and the author concludes that for safety the dose of fresh water-sterilizing powder should be that indicated by the Horrocks test plus two when the contact period is half an hour.

BOYNE and SANDGROUND (p. 487) found *S. japonicum* infection in 83 of 176 inhabitants of villages on the shore of Lake Lindoe in Central Celebes. Dysenteric symptoms were absent enlarged spleens were common but may have been due to malaria. No naturally infected snails were found but a few specimens of *Oncomelania nosophora* were discovered. BARTSCH (p. 488) claims *Oncomelania yaoni* n. sp. as an intermediate host of *S. japonicum* in the Kiangsi Province China.

BRACKETT (p. 149) advocates the use of copper carbonate in place of copper sulphate for killing snails in the control of schistosome dermatitis because it may be used safely by relatively unskilled persons and one application may be sufficient. This is only effective in limited amounts of water in larger lakes a daily application of solution of formaldehyde may be used with great care if there are enough cases of dermatitis to justify the procedure. Otherwise vigorous wiping after bathing is a useful form of prophylaxis. The cercariae penetrate the human skin largely if not entirely when the water is evaporating. He gives a method to estimate the amount of copper carbonate necessary for effective concentration. Copper carbonate is also advocated by the Committee on Water Pollution Wisconsin (p. 483).

Hsu and CHOW (p. 151) describe the development of *Clonorchis sinensis* in laboratory bred snails. GALLIARD (pp. 152-489) gives a list of the molluscan hosts of *Clonorchis sinensis* in Tonking and Annam. The most common is *Bithynia chapera* and its absence from the higher regions explains their freedom from the infection. The common fish hosts are given, and it is noted that the habit of eating raw fish is an important factor in spreading infection. Hsu (p. 152) points out that in *Pseudorasbora parva* experimentally infected with *C. sinensis* most of the cysts were found about the last few vertebrae and suggests that this may be the site of election and worthy of special search in larger fish. MIYANAGA (p. 489) reports on the fish hosts of *C. sinensis* in the Mukden area.

PLOTNIKOV (p. 152) has investigated 191 cases of infection with *Opisthorchis felinus*. There was chronic cholecystitis and cholangitis leading to cirrhosis of the liver. Chronic pancreatitis is common. In blood examinations ZERCHANINOV (p. 152) found anaemia and eosinophilia (to as much as 87.4 per cent.) which reached a maximum on the 25th to 27th day, and thereafter decreased. In the District of Nikopol, Russia, MIRONOVA (p. 153) reports eggs of *Opisthorchis felinus* in 7.5 per cent. of 501 faecal examinations. The propagation of the parasite is attributed to the eating of freshly salted or freshly dried fish.

KINUGASA (p. 490) found infection with *Paragonimus westermani* in 4.5 per cent. of 5150 persons of the Smtiku prefecture Formosa the rate has fallen in recent years. The consumption of raw or salted crabs is responsible for spread and these are eaten more by men than by women. Ho (p. 153) reports the finding of eggs of *Paragonimus westermani* in discharge from an abscess of the abdominal wall and in sputum.

SANDGROUND (p. 153) has described the life cycle of *Echinostoma ilocanum*. Near Batavia the early developmental stages take place in the planorbid snail *Anisus (G.) constrictus* Hutt. and cercariae discharged from these encyst as metacercariae in other snails, *Lymnaea rubiginosa brevis*, *Physa* *javanicus* and *Pila conica*. Man becomes infected by eating these snails and it was found that a large proportion of field rats *Rattus rattus brevicaudatus* were infected in nature. The author reports 22 cases of human echinostomiasis in lunatics, but none in their attendants or in the normal population close by—this difference is attributed to the feeding habits of the lunatics, who have been seen eating raw snails. Tetrachlorethylene in doses of 2 to 4.5 cc appears to be an effective treatment. SANDGROUND and PRAWIROHARDJO (p. 153) have found 180 specimens of adult *Echinostoma ilocanum* in the small intestine of a native who had always lived in Java.

BOYNE (p. 490) discusses infection with *Echinostoma ilocanum* in the Dutch East Indies, and gives the names of the common snail hosts. In man the infection leads to diarrhoea and slight abdominal pain with eosinophilia which subsequently subsides after a large proportion of the worms have been expelled. Infection may persist at least as long as 7 months. A wing tailed cercaria from *Anisus sarasinorum* in Lake Lindoe is probably a developmental form of the human echinostome of that region. BOYNE and SANDGROUND (p. 491) found echinostome infection in from 24 to 96 per cent. of villagers near Lake Lindoe—the infections were heavy and many worms were brought away by tetrachlorethylene treatment. The primary molluscan host is probably a small planorbid snail, though this has not yet been proved. All muscels from the lake close to the heavily infected village were found to be infected and it is pointed out that these muscels are common articles of diet and are usually insufficiently boiled. No reservoir host could be found.

BRUMPT and LAVIER (p. 151) refer to 89 human infections with *Fasciola hepatica* recorded in the literature. They consider man to be as susceptible as the sheep and that infection is contracted through eating raw watercress growing in places to which sheep have access. Early symptoms are fever, toxæmia, pain in the liver and sometimes signs at the base of the right lung. These disappear when the flukes mature and settle in the bile passages but these passages may become inflamed—eggs are found in the faeces.

Charles Wilcocks

[To be continued]

YELLOW FEVER.

PRELIMINARY ABSTRACTS IN THIS SECTION

FINDLAY (p. 431) discusses yellow fever in Africa. In the *East African Medical Journal* (p. 432) reference is made to the recent extensive outbreak in the Southern Sudan. The proposals for prevention and control, made at a Conference in Nairobi, are given—these include measures against *Aedes aegypti*, control of traffic and vaccination.

SALEUN (p 432) reports on yellow fever in French Equatorial Africa a few cases are recorded together with several sera positive to the mouse protection test

DE ASSUMPCÃO (p 433) found positive results in over half of a series of people tested for yellow fever immune bodies in the State of São Paulo Most of these had had or been suspected of jungle yellow fever during the epidemic of 1937-1938

BUGHER *et al* (p 434) have investigated the susceptibility to the yellow fever virus of certain marsupials of Eastern Colombia The virus was inoculated, but produced no signs of obvious illness in any of the animals tested. Circulating virus was found after a few days and protective antibodies were formed In nature the proportion of marsupials showing antibodies was highest in those regions where jungle yellow fever had been most prevalent and it is concluded that these animals play some rôle in the complex picture of the disease BUGHER (p 434) points out that animals which harbour the virus but which are not themselves ill may be more effective in spreading jungle yellow fever than those which become seriously ill and die He describes in detail his technique for testing the susceptibility of animals to the virus, and points out that the blood of some animals including the domestic pig and the peccary shows definite non-specific anti virus properties. He further (p 437) finds that mice less than 9 days old show susceptibility to subcutaneous inoculation of yellow fever virus equal to that shown by adult mice to intracerebral inoculation The incubation periods of both neurotropic and viscerotropic strains are prolonged when they are inoculated into baby mice. Transmission experiments with *Aedes aegypti* are recorded

NAPIER (p 437) discusses the measures taken in India to prevent the introduction of yellow fever

C IV

FINDLAY (G M) The Spread of Yellow Fever—*East African Med J.* 1941 Apr Vol 18. No 1 pp 2-7

Findlay defines the yellow fever area of Africa as shown by the mouse protection test. It runs from the west coast at latitude 15°N along the southern border of the Sahara as far as the Blue Nile The eastern limit is from the Sudan Abyssinian border to the western part of Uganda and the southern border is along the river Congo It is however possible that positive sera may be found in Western Abyssinia in the foothills of the great plateau. He refers to recent outbreaks in the Nuba mountains and near Stanleyville in the Belgian Congo

The only mosquito found infected in nature in Africa is *Aedes aegypti* but several other African mosquitoes are capable of transmitting the disease by bite in the laboratory These include *Aedes simpsoni*, *A. vittatus*, *Taeniorhynchus* (*Mansonioides*) *africanus*, *Ercimopodites chrysogaster*, *Culex thalassius* and *C. fatigans* Only in the region of Malakal in the Southern Sudan is there epidemiological evidence to suggest that *Taeniorhynchus* (*Mansonioides*) *africanus* may act as a vector

The remainder of the paper is largely concerned with the problem of the transporting of infected mosquitoes or men by aeroplanes motors and trams.

C IV

EAST AFRICAN MEDICAL JOURNAL. 1941 Jan. Vol. 17 No. 10
pp 403-408.—Yellow Fever and East Africa.

The outbreak of yellow fever in the Nuba Mountains District of the Kordofan Province of Southern Sudan, first noted in October 1940 affected an area of some 8 000 square miles and more than 15,000 cases with some 1 600 deaths have been reported. Whilst the epidemic was rapidly dying down by January 1941 the significance of this outbreak for Eastern Africa is very great, for there is now strong evidence that the infection has long been present in the Sudan, and also is probably still present in every region where mouse protection tests have given positive results.

A conference of the various Military Forces in Africa, and of the Yellow Fever Research Institution at Entebbe was held at Nairobi in December 1940 under the chairmanship of Brigadier A. J. Orenstem, in order to discuss measures of prevention or control to be instituted for the protection of Eastern Central Africa and the East African Coast.

The conference considered that it was of paramount importance that *Aedes aegypti* should be eliminated from all seaports on the East African Coast which have international or intercolonial trade: all steamships and dhows trading on or to the East African Coast: all inland urban centres and aerodromes: all steamships and dhows plying on Lake Victoria Nyanza and Lake Tanganyika: and all railway premises, also other premises in their neighbourhood and stopping places.

It was considered that not only those travelling by air but all persons whatever the mode of travel, coming from a region declared to be infected with yellow fever should be in possession of either a certificate of immunity resulting either from vaccination or a previous attack: or a certificate of non-exposure during the preceding six days. The conference also considered it desirable that all pilots and air crews and all those likely to travel by air in Africa should be inoculated against yellow fever.

Attention was called to the difficulty of diagnosing the disease in the absence of an epidemic, and the desirability of obtaining specimens of liver for pathological examination from all persons who have died from short febrile illnesses.

Lastly, the conference recommended that all practicable measures of control should be instituted on an adequate scale within the shortest possible time. It is satisfactory to note that the governments of Kenya and Tanganyika, within a few days, had provided a sum of £25 000 for intensification of yellow fever control measures.

E. HANDLE

LANCET. 1941 Apr. 6 pp 481-483.—Epidemiology of Yellow Fever

BRAZZAVILLE. AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1939 [SALEUX (G.)]. pp 58-62.—Fièvre jaune [Yellow Fever]

Mouse protection tests for yellow fever were carried out on 13 sera collected from natives in the Mouka district of Gabon, following the discovery of a strongly positive test with the serum of a European.

12 were negative and one doubtful. In July a case of yellow fever occurred at Port-Gentil and the sera of 12 natives in the district were examined with negative results. Finally, 16 sera from natives at Pointe Noire gave one strongly positive, two medium (1,280 mouse units) and 13 negative.

The serum of a chimpanzee neutralized 640 units, that of a cow also 640 units, and the serum of an ox was negative.

Blood from a case of yellow fever at Fort Lamy, collected on the fifth day of the disease, the day before the death of the patient, was sent by aeroplane to the laboratory in a thermos flask packed in ice. Six mice were inoculated intracerebrally with this blood and after 13 days developed symptoms of encephalitis. Two passages in mice were obtained, but owing to the shortage of mice it was not possible to preserve this new strain.

During the year the organs of eight Europeans and three natives were examined for their pathological histology. Nine were negative but two, both Europeans, were diagnosed as cases of yellow fever, the diagnosis being confirmed by Dr. BABLET in Paris. Clinical details are given of these two cases.

In the conclusion of the report attention is called to the difficulty of carrying on the work of the laboratory owing to the lack of mice and also to reduced personnel.

E. H.

DE ASSUMPTÃO (Lucas). Prova de proteção intraperitoneal em Camundongo no estudo epidemiológico da febre amarela silvestre. (Epidemia ocorrida no estado de São Paulo, Brasil em 1937-1938.) [Epidemiology of Yellow Fever. Protection Tests in the Camundongo (Brazilian House Rat) in São Paulo.]—*Bol. Inst. de Hig. de São Paulo* 1940 No 71 25 pp. [18 refs.] English summary.

1. The various methods for protection tests such as protection tests in monkeys and intracerebral and intraperitoneal protection tests in mice were studied and commented on.

2. The method chosen was that of intraperitoneal inoculation in mice.

3. The blood samples examined were nearly all of people who had or were supposed to have had jungle yellow fever during the epidemic which occurred in the State of S. Paulo in 1937-38. They were sent by the State Public Health Department.

4. The sera of rhesus monkeys nos. 1, 2 and 3 were negative before the inoculation of virus and positive 4 months after the inoculation of a virus isolated from patients with jungle yellow fever.

5. There were made 181 tests of which 147 were with the various sera to be examined and 34 with control serum.

6. Out of 147 protection tests made with the sera to be examined 79 were positive (53.7 per cent.), 64 were negative (38.7 per cent.) and 6 were inconclusive (4.08 per cent.).

7. All the tests made with control sera were conclusive.

8. If 34 controls, 6 tests with monkey serum and 2 tests in vaccinated individuals from different localities in the State of S. Paulo, Brasil are excluded, there remain still 139 tests. Of these 79 were positive or 56.8 per cent. and that is the percentage of positive tests obtained with blood of individuals from different localities in the State of S. Paulo, Brasil where cases of jungle yellow fever were observed during the last epidemic occurring in 1937-1938.

BUGHER (John C.) BOSWELL MANRIQUE (Jorge) ROCA-GARCIA (Manuel) & GILMORE (Raymond M.) The Susceptibility to Yellow Fever of the Vertebrates of Eastern Colombia. I, Marsupials.—*Amer J Trop Med* 1941 Mar Vol 21 No 2 pp 309-333. With 1 fig [10 refs]

An investigation into the susceptibility to yellow fever of the marsupials occurring in the Villavicencio-Restrepo area of Eastern Colombia. Jungle yellow fever was first recognized in this district in 1934 but after 1937 no further cases had been recognized up to the time of this report (July 1940). Six species of marsupials were tested, of which *Didelphys marsupialis* the black-eared common opossum, was the most abundant, and the results are shown in the table printed on page 435.

Multiplication of the virus produced no obvious signs of illness in any of the species tested. Circulating virus following small inoculation occurred between the fourth and ninth days persisting for a maximum of 4 days. More of the animals developed protective antibodies than showed circulating virus, but the titre of the protective serum was consistently lower in marsupials than in man or monkeys, in *Didelphys marsupialis* being only 1/50 that of a pool of human immune serum.

Yellow fever antibodies capable of being demonstrated by the protection test are not usually passed from the mother to the offspring either by the placenta, or by the milk, being only found in one doubtful case. Splenectomy produced no striking increase in the susceptibility to infection, in the case of *Didelphys marsupialis*.

Protection tests were carried out on marsupials mostly *Didelphys marsupialis* caught in the Villavicencio-Restrepo-Acacias region, during and after the yellow fever outbreak. Out of 48 adults and young adults captured during the epidemic 16 were positive whilst after the epidemic and up to 1940 out of 127 adults 21 were positive but 35 young adults and 81 suckling young were all negative. These results indicate that these marsupials which with the exception of a few rodents are by far the most numerous animals in the region, must play some rôle in the complex picture of jungle yellow fever in Colombia. Protection tests with wild caught marsupials from various regions are given in tabular form and reflect the regions of heaviest yellow fever incidence in man two to three years before. In the Rio Negro region where 7 out of 21 animals were positive, the incidence of yellow fever was small owing to the scarcity of settlers. Further work is in progress on other possible virus reservoirs and vectors. E H

BUGHER (John C.) The Demonstration of Yellow Fever Antibodies in Animal Sera by the Intracerebral Protection Test in Mice.—*Amer J Trop Med* 1940 Nov Vol 20 No 6 pp 809-841 With 2 figs [27 refs]

A careful study of the technique of the intracerebral protection test in mice and its application in the study of the fauna of Colombia concerning its susceptibility to yellow fever virus.

The Villavicencio laboratory where this work was carried out, was started in March 1936, and one of its problems was an investigation of

Susceptibility of marsupials to yellow fever virus.

	Genus Species						Total
	<i>Didelphys marsupialis</i>	<i>Didelphys paraguayensis</i>	<i>Philander opossum</i>	<i>Metachirus nudis scutatus</i>	<i>Caluromys laniger</i>	<i>Marmosa</i> sp.	
Virus dose m.l.d for mice	100-1 200	10	100-800	100-900	10-500	30	10-900
Number inoculated having negative protection tests	119	19	17	7	3	1	165 ** [166]
Tested for circulating virus	56	16	15*	7	2	1	57 ** [97]
Showing circulating virus	6 (11%)	0	3† (20%)	5 (71%)	2	1	17 (17%)
Surviving for post inoculation protection tests	94	14	14	4	1	0	127
Showing positive post inoculation protection tests	19 (20%)	3	3 (21%)	3 (75%)	1	0	29 (23%)

* Of these 6 were given Asibi strain 680 m.l.d

† Two showing circulating virus were inoculated with the Asibi strain

[** These figures are given in the original table they do not correspond with those in the Martinez strain.

figures are inserted in square brackets — Ed]

Corrected

factors which might be of importance in the epidemiology of jungle yellow fever. In this connexion, ambulatory animals in which the virus might circulate in the blood stream without producing any serious symptoms, would obviously be a more effective source of virus from the standpoint of transmission to other animals or man, than animals seriously ill or dying.

A susceptible animal therefore, was defined as one in which yellow fever virus would multiply irrespective of its effect on the host. Since an infected *Aedes aegypti* inoculates at a single feed approximately 100 infective doses for a rhesus monkey, a proper test dose was considered to be 10 to 1 000 minimum lethal doses (M.L.D.) for mice. The following technique was finally adopted in testing the susceptibility of animals.

A measured volume of the serum to be tested was mixed with an equal volume of virus dilution containing a definite quantity of yellow fever virus. After a definite *in vitro* contact time the mixture was inoculated intracerebrally into a group of adult white mice. These were observed daily for 10 days deaths after the fourth day being attributed to yellow fever encephalitis in the absence of definite evidence to the contrary. Details are given of the actual technique, and attention is called to sources of variability among which may be mentioned the strain of mice employed. The main difficulty however was in providing a proper dose of virus which could only be done by the use of virus inoculated with special precautions. The diluent, volume of serum used, contact time and temperature mode of injection, number of mice used (12) time spent in injection, and the time of day are all discussed. The controls used comprised virus titration and tests with immune and non-immune serum. A pool of known immune serum is best but a human immune pool used at the laboratory for nearly two years was found to show a definite decline in the antibody titre. A human non-immune pool prepared from persons thought to be non immune was found to have antibody activity such that with the virus dose usually employed about half the mice were protected.

The interpretation of the results is next discussed, and the method of establishing a standard is illustrated by giving details of a statistical study of the examination of 216 sera of *Didelphis marsupialis* considered negative.

It is shown that judgments of antibody content of a serum are best based on a detailed knowledge of the behaviour of known non-antibody containing sera of the same species in a properly balanced and controlled protection test.

The standards of negativity of a large number of species of mammals, some birds and a few reptiles of Eastern Colombia are given in tabular form. Out of 10,900 mice inoculated with serum mixtures only 143 survivals are recorded.

It was found that some species of animals showed definite non-specific anti-virus activities. The outstanding examples among mammals were the domestic pig and the peccary both of which with the usual amounts of virus gave reactions that might be interpreted as weak positives. These animals however have been shown to be susceptible to infection with small doses of virus and therefore in mouse protection tests larger amounts of virus should be used.

Another outstanding example of this activity was found in the buzzards, *Cathartes* and *Coragyps*, all nine tested showing definite anti-virus properties.

E. H.

BUGHER (John C) The Use of Baby Mice in Yellow Fever Studies.—
Amer J Trop Med 1941 Mar Vol. 21 No 2 pp
299-307

The author has tested the susceptibility of baby Swiss mice to various neurotropic and viscerotropic strains of yellow fever administered subcutaneously and finds that mice less than 9 days old exhibit a high degree of susceptibility equivalent to that of adult mice of the same strains inoculated intracerebrally.

The incubation period with both kinds of virus is prolonged when they are inoculated into baby mice in comparison with the same strains inoculated intracerebrally into adult mice. With the former the Asiatic strain in doses of 14 M.L.D. gave an average survival time of 8.7 days the French neurotropic in doses of 27 M.L.D. 7.6 days and the Martinez strain isolated from a non fatal case of jungle yellow fever in Colombia, in doses 4.8 M.L.D. gave a survival time of 11.2 days. It is evident therefore that the marked difference in incubation times between neurotropic and viscerotropic strains of virus inoculated intracerebrally are not shown when studied by the subcutaneous route in baby mice.

In insect transmission studies mice 3 or 4 days old are used, and it is necessary to restrain the activity of the mice to allow the mosquitoes to bite the animals. They may either be fixed to a small block of wood by two narrow strips of adhesive plaster one transversely over the head and the other over the hind legs and tail leaving the back free. Alternatively the insect is put in a short test tube and the open end of the tube then applied to the back of the mouse and held in position by a strip of adhesive plaster. The mice can be marked by tattooing their tails with india ink using a tuberculin syringe and a fine needle. Each puncture leaves a clean dot and 6 or 7 such marks can be made along the tail. The results of an experiment in which 10 *Aedes aegypti* infected with the Martinez strain were placed, one on each of 10 two-day-old mice, are given in tabular form. It is of interest that only 5 mosquitoes became engorged and 3 out of the 5 mice on which they fed became infected, whilst 4 out of the 5 mosquitoes that bit without taking any visible blood also transmitted the infection. The virus content of the five mosquitoes that became engorged was afterwards tested and found to range from 217 to more than 3 000 M.L.D.

E H

NAPIER (L. Everard) Yellow Fever—*Indian Med Gaz* 1941
Mar Vol 76 No 3 pp 170-177 With 1 fig 4 charts
& 1 map

A good general account of the subject with special reference to the importance of yellow fever to India and the rest of Asia.

Details are given of the quarantine regulations that are now enforced at Karachi on all passengers arriving by aeroplane from Africa and no aeroplane is allowed to come to Karachi from any endemic area unless it has passed through either Khartoum or Cairo where there are anti-malarial aerodromes. Further precautions include spraying of the inside of the aeroplane if the disinsection certificate is not in order or if there is on board any passenger who does not hold a certificate indicating that it was at least 9 days since he was in an endemic area. In addition any such passenger is detained until the

expiration of this period, in a special mosquito-proof ward to which he is taken in a mosquito-proof ambulance. No person is allowed to enter India by air except at Karachi, where these facilities exist, and under no circumstances whatever is yellow fever virus allowed to be imported, even by laboratory workers. E H

THE TYPHUS GROUP AND OTHER FEVERS

PRECIS OF ABSTRACTS IN THIS SECTION

Louse- and flea-borne typhus—In the *Lancet* (p. 440) is an annotation which refers to a recent outbreak of typhus, presumably louse-borne in Madrid and other part of Spain. The Cox method of preparing vaccine is mentioned.

Discussing atypical typhus MOROZKIN (p. 440) states that in Russia cases in which the fever lasts only 9 days are no more than 2.1 per cent. of the whole. In children the rash may be indistinct and there may be a tendency towards remission but even in atypical cases there are usually enough indications of the nature of the disease for a correct diagnosis to be made. CROMASCHIEWSKI and MOROZKIN (p. 441) in Russia find no support for the view that typhus is less severe in summer than in winter.

HARALSO (p. 441) states that in the Territory of Hawaii the incidence of typhus was greater in 1940 than in 1939. 77 cases were reported in 1940.

MOYNIER (p. 441) describes the pulmonary lesions in experimental typhus.

DOWDS (p. 442) reports an outbreak of mild typhus without visible rash in native labourers on a copper mine in Rhodesia. *Proctus O179* was agglutinated in high dilution and scrotal lesions were produced in guineapigs on injection of blood from the patients. Many rats were seen in the men's huts. BHATIA (p. 442) describes a case of presumably flea-borne typhus in a resident of Lucknow. There were no other cases in the neighbourhood. ASANO (p. 442) reports on 88 cases of typhus, presumably murine in Okavima. Only two were fatal. The Weil-Felix reaction was positive in all by the fourth week. CURBELO *et al.* (p. 442) have found a murine virus in a rat in Pinar del Rio. The human disease there is regarded as of murine origin. NAUCK and ZUMPT (p. 443) confirm previous findings by other workers in concluding that the bed bug is of no importance in the transmission of murine typhus.

Tick and mite-borne typhus—DR MAGALHÃES and MOREIRA (p. 443) describe an exceedingly acute form of typhus which occurs in Minas Geraes. Death may be so sudden that the suspicion of foul play is raised. They discuss the actual cause of death. DR MAGALHÃES (p. 444) reports inapparent typhus in a woman and in a dog in Belo Horizonte. In both cases the blood was infective to guineapigs and the Weil-Felix reaction positive as a group reaction. Both the woman and dog were in good health. With PEREIRA (p. 444) this author gives

details of a series of electrocardiographic examinations of typhus patients. He also (p 444) gives a list of animal reservoir hosts in Minas Geraes.

GUNTHER (p 445) has investigated mite borne typhus in New Guinea where the disease is almost confined to white men working in virgin bush. No cases have been seen in natives. The vector is probably *Trombicula minor* and the animal reservoir is the bandicoot.

HEASLIP (p 445) discusses tsutsugamushi in Queensland the chief diagnostic signs of which are primary sore rash and positive Weil Felix reaction to *Proteus O*1A. *Trombicula deliensis* is found on rodents in the neighbourhood and is the probable vector.

Q fever etc.—BENGTSON (p 446) has shown by agglutination and absorption tests that the organisms of Australian and American Q fever are to be regarded as the same. Though there is some difference in virulence this is no more than may be observed between different strains of Rocky Mountain fever viruses. LILLIE *et al* (p 446) describe the pathological appearances found in a patient who had died of pneumonitis in an institution. These were essentially the same as those found in monkeys inoculated into the lung with strains of the virus of Q fever but Rickettsiae were not seen in either the human or the animal tissues. DERRICK *et al* (p 447) have shown that beside the bandicoot seven rodents and two marsupials are susceptible to the virus of Q fever.

WEBB (p 447) records the finding of Rickettsia like bodies in *Triatoma rubrofasciata* in Mauritius. They were present in all organs examined and are apparently transmitted hereditarily to the embryos the bodies produced lesions in laboratory animals.

Agglutination tests.—For agglutination tests HUDSON (p 448) has made use of emulsions of Rickettsiae from lungs of infected rats and mice. With immune sera the Rickettsiae were clumped and clear-cut results obtained.

CASTANEDA *et al* (p 448) describe a rapid method of performing the Weil-Felix reaction this can be carried out at the bedside and if the result is strongly positive it occurs almost instantaneously. LEVIN (p 449) found some relationship in the Weil Felix reaction between the agglutination and the globulin content of the immune sera. DWYER and ATKINSON (p 449) report tests on sera from persons not suffering from typhus in S Australia. Several gave positive results with the H type of a local strain of *Proteus*.

ESSEVELD and KOUWENAAR (p 449) have investigated a number of strains of *Proteus Y* from human sources. Some of these are as suitable for diagnostic purposes as the standard strain *Proteus YK* but others are only partially effective. The same applies to the *Proteus Y19* strains. None of the strains obtained from guineapigs corresponded to standard *Proteus A*.

Inoculation.—GEAR (p 450) describes the production of typhus vaccine by growing the Rickettsiae in the chick embryo and states that by this method sufficient quantities for large scale production of vaccine could be supplied. TCHANG and MATHEWS (p 450) describes the preparation of vaccine of *Rickettsia prowazekii* by the inoculation of eggs with infective material and incubation for 5 days. The vaccine is standardized by comparison with the numbers of Rickettsiae found in infected intestines of lice and gives solid immunity in guineapigs. It has been used in man. KUROTCHIN and WICKOFF (p 451) find that vaccine of the Rocky Mountain

fever organism prepared by cultivation in fowl embryo has about the same immunizing power as that prepared by cultivation on agar slopes but that the former method is easier to carry out and is less costly. The same findings apply also to vaccines against epidemic typhus.

Other fevers.—HEASLIP (p. 431) has investigated the "coastal fever" of Queensland and its differentiation from scrub typhus. Mice inoculated with the blood of patients suffering from coastal fever only do not die, but when examined are found to be infected with a pleomorphic organism, probably of the anthrax group which, though it grows readily on media at temperatures between 20° and 30°C will not grow at 37°C. Mice infected with the coastal fever organism remain susceptible to scrub typhus and the sera of persons recovered from coastal fever do not contain agglutinins for *Proteus OVK* but the two diseases quite commonly occur together and the pleomorphic bacilli may be recovered from sera the clots of which give rise to typhus when inoculated into animals. The coastal fever bacillus was found in 70 per cent. of rats and bandicoots examined in the localized area in which the disease occurs and the author considers that the disease may be transmitted by a mite, a mosquito or a tick. The symptoms of coastal fever include adenitis and sore throat.

WEINMAN (p. 453) shows that in S. America bartonellosis is now a major health problem, and that in Colombia it has recently reached epidemic proportions. The parasite of this disease may be found in the blood of convalescent or of healthy carriers. It is suspected that transmission may be effected by lice or ticks—sandflies are apparently not incriminated in Colombia. RAY and LOYANI (p. 453) refer to bartonellosis in dogs in India. JORVEX and BUDINGER (p. 453) show that *Bartonella bacilliformis* is readily cultivated within the allantoic fluid of the developing chick embryo, at room temperature and that it will also grow in that fluid *in vitro*.

ANDERSON *et al* (p. 454) report on investigations on sandy fever in India. C II

LANCET 1941 Apr 28. 549—Control of Typhus.

This note is recorded here because it contains a reference to the recent outbreak of typhus in Madrid in which it is reported that some 300 cases have been discovered and that 20-30 cases were being diagnosed daily. The disease is said to have broken out also in Murcia, Granada, Seville and Almeria. Vigorous action on the usual lines for louse-borne typhus has been taken, and the annotation in the *Lancet* refers to the possibility that vaccine prepared according to the method of Cox, by inoculating the yolk sac of the developing fowl embryo may prove to be a valuable aid in prevention in such outbreaks. [See this Bulletin 1939 Vol. 36 p. 984 1940 Vol. 37 pp. 268, 362, 460. C II]

МОРОЗКИН (N 1) The So-called "Atypical" and "Abortive" Forms of Typhus.—*И Мировой Эпидемии и Иммунологии* Moscow 1940. No 8. In Russian pp 44-51. With 4 charts. [28 refs.] English summary p. 52.

"Great epidemiologic interest presents the disputable question whether or not there exist atypical and abortive forms of typhus.

The indistinct appearance of one of the symptoms of typhus—the rash of the general reaction (typhus condition) and of the fever reaction is more often observed among children.

“Employing the method of thermometry at the typhus nidus the author definitely established the limits of the abortiveness of typhus which has been reduced to a 9-days-fever. However the nine-day course of the fever has been observed in 2.1 per cent of the cases only.

The stability of the fever reaction in typhus can be explained by the specific peculiarities of the causative virus. Fallacious conclusions as to the shortened course of the disease may be drawn by non-consideration of the first days of the disease.

The propensity to remissions is one of the signs of atypicality of typhus in children.

There have been sufficient symptoms for a correct diagnosis to be made in the series of atypical cases presented by the author selected from 1,133 cases of typhus under his observation.

GROMASCHIEWSKI (L.) & MOROZKIN (N.) Sommer Flecktyphus [Summer Typhus].—*Jl Microbiol Epidemiol et Immunobiol* Moscow 1940 No. 8 [In Russian pp 52-55 German summary.]

The authors have found that there is no essential difference between typhus which occurs in summer and in winter. The febrile period is the same (14.9 and 14.4 days respectively) the complications are the same and the mortality rates equal (5.2 and 5.0 per cent respectively). They therefore reject the theory held by many workers that the virulence of the disease is less in summer than in winter. In summer as in winter patients with the disease are equally dangerous as potential sources of spread.

C II

HAWAII TERRITORY OF BOARD OF HEALTH. REPORT FOR FISCAL YEAR 1940 [HARALSON (M F)] p 95.—[Typhus Fever]

Typhus fever increased markedly, cases being reported from all islands except Lanai. This disease also set a record for cases occurring during the year on Hawaii, Oahu and Kauai as well as the Territory. Seventy-seven cases and one death were reported for the year as compared with 57 cases and one death in 1939.

MOVNIER (A.) Lesión tífosa experimental en pulmón de animales de laboratorio [Pulmonary Lesions in Experimental Typhus].—*Medicina* Mexico 1940 Nov 10 Vol 20 No 373 pp 548-550

In animals infected by the intranasal route there is peribronchial pneumonia, with large numbers of Rickettsiae. In infection by other routes the lesions are similar but less intense. In man there is oedema and passive congestion, diapedesis of leucocytes and peribronchial pneumonia. There is blood pigment in the macrophage cells but Rickettsiae are not found.

C II

DOWDS (J H) A Preliminary Report on a Series of Cases of Murine Type Typhus in Northern Rhodesia.—*South African Med J* 1941 Jan. 25 Vol 15 No. 2. pp. 30-32.

A number of mild cases of typhus have been met with among the natives living in the compound of the copper mines. The cases were clinically typical of typhus except for the fact that in no case could any rash be detected. The Weil-Felix reaction was positive for *Proteus OX19* in all cases up to 1/6400 and *Proteus OX2* was also agglutinated in one case the titre was 1/1,600 for *OX2* and 1/800 for *OX19* but in the remainder of the cases *OX2* was only agglutinated in low dilutions. Cultures of blood, urine and faeces were made in all cases but without result. Injection of blood from six of the patients caused pyrexia, scrotal lesions and death in six guinea-pigs. There was no history of tick bite in any of the cases and none had been away from the station for over a month. Many rats were seen in the men's huts.

D Harvey

BHATIA (B B) Sporadic Typhus.—*Jl Indian Med Assoc* 1940 Oct Vol 10 No 1 pp 30-32

A moderately severe case of typhus fever with a maculo-papular rash, delirium and a positive Weil-Felix reaction for *Proteus OX19* is described. The patient had been resident in the City of Lucknow for several years and had not been away for many months. There were no other cases in his household or the neighbourhood, the author therefore concludes that this was a case of sporadic urban typhus probably carried by rats and rat fleas.

D H

ASANO (Shizuo) Statistische Beobachtungen ueber das Fleckfieber in der Gegend von Okayama. [Statistical Observations on Typhus Fever in the Neighbourhood of Okayama.]—*Okayama-Igakkaï-Zasshi (Mitt d Med Gesellsch z Okayama)* 1941 Jan Vol 53 No 1 [In Japanese pp 104-116 With 4 charts. [58 refs German summary pp. 116-117]

During the last few years 88 cases were observed. These cases were most common in the period May to December in each year. Duration of the fever was from 8 to 23 days and the average was 14 days. A rash was observed in 93 per cent of the cases and this rash appeared from the third to the sixth day. The Weil-Felix [presumably with *Proteus OX19*] reaction was positive in 46 per cent. of the cases by the end of the first week of the fever in 79 per cent. during the second week, in 84 per cent. during the third week and in 100 per cent. during the fourth. Only two cases were fatal.

[This is presumably flea borne murine typhus, though no statement to that effect is given in the German summary nor is the type of *Proteus* used in the Weil-Felix reaction mentioned.]

D H

CURBELO (Arturo) VELA (Enrique Mantero) & MORENO (Abelardo) Comprobación de un virus murino en los estudios del tífus pmareño. [Identification of a Murine Virus in the Study of the Typhus of Pinar del Río.]—*Ida Nueva* 1941 Feb Vol. 47 No 2 pp. 53-62. With 9 figs.

The authors examined a rat (*R. norvegicus*) from Guanajay in the Province of Pinar del Río. Injection of its blood into guinea-pigs

produced, in one of these animals lesions typical of those found with the virus of murine typhus with scrotal reaction in which Rickettsiae were plentiful. The blood of the rat however failed to give the Weil Felix reaction. Fleas from the rat were ground up and injected into guinea-pigs but without result. The authors regard the typhus of Pinar del Rio as of the murine type [see this *Bulletin* 1941 Vol 38 p 203] C W

PHILIP (Cornelius B) Rocky Mountain Spotted Fever.—*Bull Med Library Assoc* 1940 Dec. Vol. 29 No 2. pp 86-92. With 4 charts. [19 refs]

A paper read at the annual meeting of the Medical Library Association and illustrated by slides and moving pictures and references to the literature D H

NAUCK (E G) & ZUMPT (F) Versuche zur Uebertragung der murinen Fleckfiebers durch die Bettwanze [The Question of the Transmission of Murine Typhus by the Bed Bug]—*Zent f Bakt I* Abt Orig 1940 Aug 15 Vol 148 No 3 pp 97-103

Although *Rickettsia mooseri* remains virulent in *Cimex lectularius* for as long as 20 days after intracoelomic injection experiments on transmission from mouse to mouse by the bites of these bugs were negative and the crushing of infected bugs on the skin also failed to cause infection. These results confirm those obtained by CASTAÑEDA and ZINSSER [this *Bulletin* 1931 Vol 28 p 96] which indicated that *C. lectularius* was of no importance in the transmission of murine typhus C W

DE MAGALHÃES (Octavio) & MOREIRA (João Afonso) Typho exanthematico em Minas Geraes. Aspectos clinicos. [Typhus in Minas Geraes Clinical Aspects.]—*Brasil-Médico* 1940 Apr 6 & 13 Vol 54 Nos. 14 & 15 pp 252-260 272-278.

The authors describe a condition which they name *typhus siderans*. In this extremely acute form the onset is sudden, without prodromata or exanthemata and death takes place in two or three days. There is high fever delirium and intense headache. Death may occur suddenly in apparently robust patients and they have been known to die in the street so quickly that the suspicion of crime has been raised. Post mortem examination aided by animal inoculation has proved such cases to be due to typhus. The cause of this sudden death cannot be attributed to myocarditis and the authors suspect that it may be due to azotaemia, acidosis and the action of the virus on the nerve centres or the heart or to nephritis.

The authors discuss the diagnosis and prognosis of typhus in Minas Geraes and give a list of drugs which have been used in treatment but which have had little effect. Very full details of 9 cases are given. (108)

- I. DE MAGALHÃES (Octavio) Typho exanthematico em Minas Geraes. Molestia humana inaparente—do naturalmente in infectado. Nota prévia. [Typhus in Minas Geraes. Inapparent Human Infection. Natural Infection in a Dog.]—*Brasil-Médico* 1940 July 27 Vol 54. No. 30 pp 503-504
- & PEREIRA (Renato) Typho exanthematico do Brasil, em Minas Geraes. Estudos electrocardiographicos. [Electrocardiograph Studies.]—*Ibid* Aug 3 10 17 24 31 & Sept. 7 Vol. 64 Nos 31 32 33 34 35 & 36 pp 519-528 541-544 588-590 578-581 592-598 608-609 With 30 figs. English summary

L. A. patient with severe typhus was admitted to and died in hospital at Belo Horizonte. Two days later his wife was examined, and though she was apparently healthy with normal temperature and pulse injection of her blood produced typical typhus lesions, with fever in a guinea pig and from this animal others in series were infected with the same results. In one of the guinea pigs the scrotal reaction was present. The blood of this woman gave the Weil-Felix reaction to a titre of 1/80 with *Proteus* OY19 and to a titre of 1/40 with *Proteus* OX2. This was regarded as a group reaction. After an interval of 37 days her blood failed to infect a guinea pig and the Weil-Felix reaction was reduced to 1/20 with *Proteus* OY19. She is therefore regarded as a case of inapparent infection.

In the same house there was an apparently healthy dog blood from this animal produced typhus lesions, with scrotal reaction on injection into a guinea pig, and the infection was carried in series to other animals. After 28 days, and 40 days after the death of the first patient the blood of the dog was still infective, and gave a reaction *Proteus* OXK in dilution 1/320. The animal was then lost sight of.

(i) In this series of papers the authors give minute details of examinations made of 11 patients. The electrocardiographic findings are recorded in an English summary —

The present work was based on 14 electric tracings of the heart of 11 patients the examination of whom was detailed and as far as possible, complete. They were all serious cases of exanthematic typhus met with in Minas Geraes. It was found possible to make an autopsy of the majority of these cases, 4 dating from 1837 4 from 1898 and 3 in 1939.

In all the tracings the A A verified a minimal tachycardia and clear electrocardiographic signs of myocardiac hypotonia.

In the majority they found myocardiac hyper-excitability and functional deficiency of His's bundle. In some of the tracings there was a deviation, or a tendency to deviate either to the right or to the left. In one case they noticed the appearance of an extra-systolic manifestation, without compensation or posterior rest, the interpretation of which was not perfectly established.

No signs were found of organic lesions of the differentiated conductor system or of extensive lesions of the myocardium, thus agreeing with the anatomical and pathological findings on the macroscopic and microscopic examination which showed focal myocarditis.

C W

DE MAGALHÃES (Octavio) Typho exanthematico em Minas Geraes. Nota prévia. [Typhus in Minas Geraes. Preliminary Note.]—*Brasil-Médico* 1940 June 8 Vol 64 No 23 p 393.

It has been proved that certain animals may act in nature as the reservoir of the typhus of Minas Geraes, and the author mentions th

following —the dog the preá and the gambá (species of opossum *Canis operea* and *Didelphys marsupialis*) the fox (*Canis brasiliensis*) the cotia (a rabbit like rodent *Dasyprocta azarae*) and the bush rabbit (*Silvilagus muenzensis*). He now shows that the wild cat (*Felis tricti*) though not very susceptible to the disease can be infected experimentally and may therefore be a reservoir in nature C IV

GUNTHER (Carl E M) A Survey of Endemic Typhus in New Guinea.—*Med Jl Australia* 1940 Nov 30 27th Year Vol 2 No 22 pp 564-573 [58 refs.]

Clinically these cases show a primary eschar with local lymphadenitis sustained moderate fever low pulse rate severe toxæmia enlargement of the spleen and typical rash and therefore resemble Japanese River fever. The disease is practically confined to adult white males who are employed in clearing areas of virgin bush or who are otherwise occupied in newly cleared areas.

A full clinical description of the disease is given with detailed instruction in the methods employed in carrying out the agglutination tests. *Proteus OAK* is agglutinated and the following deductions are drawn from the results.

In a mild case in which the agglutination is not higher than 1/80 prognosis is good in severe cases in which the agglutination reaches a titre of 1/320 or higher prognosis is also good but in severe cases if the titre does not rise above 1/80 prognosis is bad especially in elderly alcoholic individuals. So far the author has been unable to detect any cases of the disease in the natives of the country. A very careful survey of the various species of mites and their animal hosts has been made by the author and he concludes that the vector of the disease is *Trombicula minor* and the animal reservoir is the bandicoot

D H

HEASLIP (W G) Tsutsugamushi Fever in North Queensland, Australia.—*Med Jl Australia* 1941 Mar 29 28th Year Vol 1 No 13 pp 380-392. [41 refs.]

A typhus-like fever similar to Japanese river fever has been reported in Queensland so long ago as 1913 and in 1927 a series of cases was described. The chief diagnostic symptoms in these cases were a primary sore a rash and a positive Weil Felix reaction with *Proteus OAK*. In the present paper 54 cases were investigated and full details of the cases are given in tabular form only one of the cases was fatal. Many cases in the present series showed a blood infection with the bacillus described by the author in an earlier paper (see below p 451). As regards diagnosis of the cases this is simple if the true primary sore is detected but in the present series this was noted only in 17 out of 48 cases a rash was observed in 29 of the cases but in this investigation the best diagnostic aid was the inoculation of the blood of fever cases into mice in positive cases the animals died in about 10 days and showed pleural and peritoneal effusion and enlarged spleen. In practically all the cases in which it was possible to make repeated examinations of the sera of the patients there was a definite evidence of the rise and fall of the agglutination titre for *Proteus OAK*. A laboratory assistant whose duties included the inoculation of mice with the blood of the fever cases and the

subsequent examination of these animals contracted the disease he had 11 days of fever a rash appeared on the 5th day and a sore was noted on his finger with lymphangitis extending up to the elbow. Mice were inoculated with his blood and those inoculated during the febrile period became infected and died with the typical post mortem appearances also his blood serum agglutinated *Proctus OVK* in high dilutions. Guinea pigs rats rabbits and monkeys were also shown to be susceptible to the virus and rats and bandicoots caught in the scrub and swampy areas where all the patients had contracted the disease were shown by means of the mouse test, to be naturally infected. As regards the vector 90 per cent of the larval mites caught on wild rats and bandicoots were found to be *Trombicula deliensis* and it is therefore probable that this mite is the vector here as elsewhere.

D H

BENGTSON (Ida A) Immunological Relationships between the Rickettsiae of Australian and American "Q" Fever.—*Public Health Rep* 1941 Feb 14 Vol 56 No 7 pp 272-281 (11 refs)

Agglutination and absorption tests were carried out with the two viruses. Emulsions of these organisms were prepared from the livers and spleens of infected mice. In the course of this work it was noted, as had already been reported in Australia and America that the N (American) virus is distinctly more virulent than the Q (Australian) virus yet it is pointed out that in this respect the two viruses do not differ more than do different strains of Rocky Mountain fever virus. Suspensions of Rickettsiae were prepared by centrifuging and suspending the precipitates. Immune sera were prepared by inoculation of rabbits with purified emulsions of Rickettsiae killed by addition of 1/10 000 merthiolate. Human sera obtained from Australia were also used in these tests and the results showed a close relationship between the two Rickettsiae there being practically no difference in the results obtained. Absorption tests were also carried out and the results of these tests gave further evidence of the identity of the two organisms. Precipitin tests also confirmed this opinion.

In view of the practical identity of the results in the serological tests and of results already obtained in cross immunity and cross protection tests in animals it would appear justifiable to consider the Australian and the American types as one and the same. D H

LILLIE (R D) PERRIN (T L) & ARMSTRONG (Charles) An Institutional Outbreak of Pneumonitis. III. Histopathology in Man and Rhesus Monkeys in the Pneumonitis due to the Virus of "Q" Fever.—*Public Health Rep* 1941 Jan 24 Vol 56 No 4 pp. 149-155 With 6 figs. on 2 plates. [Summary appears also in *Bulletin of Hygiene*.]

Parts I and II of this investigation, the first dealing with epidemiological and clinical studies, the second with the isolation and identification of the causative agent, have unfortunately not reached the Bureau. They were published towards the end of 1940 and have probably met the fate of much else that is good at the hands of the enemy.

The present study the third in the series details the pathological findings of a fatal human case reported in the first paper and compares these with the lesions following intrapulmonary inoculation of *Macaca mulatta* with strains of the Q fever virus

The patient was a white man aged 59 years his illness started as a cold on 17th April 1940 On admission to hospital 5 days later his temperature ranged between 102° and 103.5°F There was dullness over the lower lobe of the right lung posteriorly and a smaller area over the left lung He died three days later Macroscopically autopsy revealed congestion and oedema of left lung more of lower lobe firm grey granular consolidation of right upper lobe posteriorly Microscopically diffuse consolidation with compact fibrino-cellular exudate interalveolar septa show accumulated lymphoid plasma and large mononuclear cells and a varying degree of fibrin Small patchy peribronchial pneumonic areas were also seen

Bronchi in the latter areas contain purulent exudate their epithelium has desquamated and polymorphonuclears in moderate numbers infiltrate their walls which are focally necrotic The pneumonic exudate consists of fibrin and variable proportions of polymorphonuclears macrophages and red blood cells Gram positive and gram negative cocci are fairly numerous and are chiefly intracellular Peribronchial perivascular and pleural fibrosis is of moderate degree and there is focal lymphocyte and plasma cell infiltration in these areas

The lesions produced in eight monkeys inoculated into the right lung with four strains of Q fever virus were essentially the same as the above Rickettsiae were not seen in either the human or animal material The pathological changes in other organs are mentioned but show nothing of special import H H S

DERRICK (E. H.) SMITH (D. J. W.) & BROWN (H. E.) Studies in the Epidemiology of Q Fever 6 The Susceptibility of Various Animals.—*Australian Jl Experim Biol & Med Sci* 1940 Dec Vol 18 Pt 4 pp 409-413 With 1 fig [Summary appears also in *Bulletin of Hygiene*]

The authors have carried out an experimental investigation the results of which indicate that *R. burneti* the cause of Q fever has a wide range of potential hosts and that the reservoir hosts may include several beside the bandicoot (*Isodon torosus*) Nine other species of bush animals were tested for susceptibility—recovery in the guinea pig of Q virus from an intraperitoneally inoculated animal was accepted as demonstrating susceptibility—seven rodents and two marsupials and all were found susceptible though the infection was mild in all and in some inapparent. The rodents were *Rattus eximilis* *R. conatus* *R. culmorum* *R. tateolus* *Hydromys chrysogaster* *Melomys litoralis* and *Thelomys gracilicaudatus* the two marsupials were *Trichosurus vulpecula* and *Aepyprymnus rufescens* [Previous references are given in this *Bulletin* 1941 Vol 38 p 208.] H H S

WEAB (J. Lewis) The Occurrence of Rickettsia-like Bodies in the Bedbug Bug *Triatoma rubrofasciata* and their Transmission to Laboratory Animals.—*Parasitology* 1940 Nov Vol 32, No 4 pp 355-360 With 1 fig

The experimental work recorded in this paper was carried out in Mauritius. Ten bugs were examined smear preparations were

made from seven and three were sectioned. In all *Rickettsia*-like bodies were readily demonstrated in stained smears from every organ of the body examined. Coccoid bodies and lanceolate forms were noted and also rod-shaped organisms which were the predominating type and which were found intracellularly and also intranuclearly. These *Rickettsia* bodies are transmitted hereditarily and were found in the unhatched embryo and in larvae of the bug.

The organisms produced pathological lesions in laboratory animals and could be maintained for at least five passages in guinea-pigs.

D H

Hudson (N. Paul). A Macroscopic Agglutination Test with Typhus *Rickettsias* prepared from Infected Rodent Lungs.—*Jl Infect Dis* 1940 Nov-Dec Vol 67 No 3 pp. 227-231

The emulsions of *Rickettsiae* for these tests were obtained from the infected lung of rats and mice. These were tested against immune and normal sera in small tubes. The tubes were placed in a water bath at 40 C for 3 hours; the results were then read and the tubes held in the cold overnight and again read. Clear-cut results were obtained with immune sera. Cases of typhus tested gave positive results, complete clumping, in dilutions ranging from 1/320 and 1/128,000. All controls were negative.

D H

CASTAÑEDA (M. Ruiz), SILVA (Roberto) & MONXIER (Alberto). Diagnóstico específico y no específico del tifo exantemático. (Specific and Non-Specific Diagnosis of Typhus.)—*Medicina*, Mexico 1940 Oct 10 Vol 20 No 373 pp. 509-513. With 1 fig. English summary (3 lines).

The authors prepare the antigen from *Proteus OX19* as follows.—The bacilli are suspended in physiological saline containing 10 per cent. formalin and this emulsion is maintained at room temperature for 72 hours. It is then filtered through cotton and the filtrate is centrifuged, the sediment being resuspended in as small a quantity of 11 per cent. sodium citrate solution as will produce a suspension. The suspension is standardized and used in various dilutions together with serum of known titres 1 in 100 and 1 in 1,000. The dilution which gives rapid and clear reaction with high titre serum and light reaction with low titre serum should be used, and to make the reaction more clear enough aqueous methylene blue solution is added to the suspension to give an intense blue colour.

With this antigen the Weil-Felix reaction can be carried out at the bedside and if strongly positive occurs almost instantaneously.

Agglutinins against suspensions of *Rickettsia prowazekii* appear in the blood earlier than those against *Proteus OX19* and have been found as early as the 6th day of illness. The technique of the test is simple and the agglutination is easily read under the microscope. C II

CASTAÑEDA (M. Ruiz) & SILVA (Roberto). Prueba rápida para el diagnóstico del tifo exantemático a la cabecera del enfermo. [A Rapid Bedside Diagnostic Test in Typhus.]—*Medicina*, Mexico 1940 Oct 10 Vol 20 No 373 pp. 505-509. English summary.

"A rapid agglutination test for the diagnosis of typhus fever has been studied and corroborated by a subsequent Weil-Felix reaction.

The method is simple and so far no false positive reactions have been observed. It is only qualitative and is not more sensitive than the ordinary tube agglutination.

The test is performed with whole blood taken from the ear or the patient's finger. The amount of blood is measured with a platinum loop of 5 mm diameter and one loopful is mixed with one standard drop of the antigen on a clean slide. The slide is kept moving to and fro during one minute then the test is read. When the blood and antigen remain in a uniform mixture the test is negative. A positive test shows clumps of the antigen which usually gather around the edge of the drop forming a ring which can be detected by its whitish colour in contrast with the red cells. A convenient incidence of the light favours the readings. No doubtful tests are considered and no readings are reliable after one minute.

The antigen is a suspension of *Proteus* O119 in 11 1 000 solution of sodium citrate with 0.2 per cent formalin. A 24 hour growth in Petri dish is washed in 5 cc of diluent to obtain the optimum concentration. This emulsion is kept in the refrigerator and gives good reaction for two months.

LEVIN (J) Materialien zur Kolloidchemischen Theorie der Bakterienagglutination (in der Weil Felix'schen Reaktion) [The Colloidal Chemistry of Bacterial Agglutination (the Weil Felix Reaction)]—*Jl Microbiol Epidemiol et Immunobiol* Moscow 1940 No 11 [In Russian pp 34-41 With 3 figs. German summary]

A series of agglutination tests was carried out with *Proteus* antigens and varying concentrations of electrolyte and specific sera. Agglutination was noted in various zones of these concentrations and disclosed some relation between the agglutination titres and the globulin content of the immune sera.

D H

DWYER (J M) & ATKINSON (Nancy) Some Observations on Endemic Typhus in South Australia.—*Med Jl Australia* 1940 Nov 30 27th Year Vol 2 No 22 pp 573-576 [11 refs.]

Agglutination tests with *Proteus* O119 were performed with sera from 351 persons not suffering from typhus fever. The highest titre recorded was 1/80 and was found in only one specimen of serum.

In tests with H and O antigens of *Proteus* XA and Hill (a local strain) on 161 specimens of serum sent in for Wassermann reaction it was found that agglutinins for *Proteus* OXA, O Hill and HXA were rarely found at a dilution greater than 1/20. Agglutinins of H Hill were encountered more frequently, one specimen of serum had a titre of 1/320. 3 specimens had a titre of 1/160 and six had a titre of 1/80.

Thirty three local rats were examined but no evidence of typhus infection could be found in any of these animals.

D H

ESSEVELD (H) & KOUWENAAR (W) Onderzoek naar het voorkomen van *Proteus*- λ stammen [Characters of Strains of *Proteus* λ]—*Geneesk Tijdschr v Nederl-Indië* 1940 Aug 6 Vol. 80 No 32 pp 1871-1895 [12 refs.] English summary

The authors have not been able to cultivate *Proteus* bacilli from the blood of patients suffering from mite fever, shoop typhus and scrub typhus.

" Out of 123 *Proteus* strains derived from human products (chiefly stools from patients with diarrhoea as well as nasal mucus from healthy people) 100 were anindologenic and only 23 indologenic.

Of these strains 25 gave a strong O-agglutination in rabbit-anti sera against one of the standard Δ -strains viz.

20 anindologenic and 2 indologenic in anti Δ Kingsbury serum.
3 indologenic in anti Δ 19 serum.

As far as the 22 strains that reacted strongly with the anti- Δ K serum were followed up sufficiently, as appears from the ability to agglutinate in sera from mite fever and scrub typhus patients, they all seem to possess more or less an Δ K-character. Some strains are just as suitable for diagnostic purposes as the standard Δ Kingsbury strain, while others react with part of the sera from patients only. The results make it probable that the composition of the Δ K-antigen in different strains may not be uniform.

The 3 strains that reacted strongly with the anti Δ 19 serum react in the same way with shop typhus sera, so they have to be taken as real Δ 19 strains. It seems that with these strains too the Δ -antigen does not correspond fully with that of the standard Δ 19 strain.

The examination of 57 *Proteus* strains derived from guineapig stools and 19 from other sources (putrified meat mud rotten vegetables, river-water and guineapig manure) showed that of these strains by far the majority is anindologenic viz. 16 and 50 respectively. Against the O antigens none of these strains corresponded to a considerable degree with the standard Δ strains.

GEAR (James) Vaccination against Typhus Fever With Special Reference to Egg Cultures in the Preparation of Vaccine.—*South African Med J* 1940 Dec 28 Vol 14 No. 24 pp 476-481 With 2 figs [28 refs]

A review of the subject is given at the beginning of this paper followed by a description of the methods employed by the author in preparing vaccine from the virus of louse-borne typhus.

The method of Cox inoculation of the chick embryo through a hole made in the blunt end of the egg was found to be most constant and satisfactory. Indeed the growth of the Rickettsiae from an epidemic strain was abundant and appeared in masses. This abundant growth was not apparent until after the third subinoculation in eggs. In the case of seven-day chick embryos it was observed that all the tissues of the chick were heavily infected but in fourteen-day embryos it was often noted that the chorio-allantoic membrane was more heavily infected than the yolk sac or embryonic tissues and gave the appearance of a confluent growth.

In the author's opinion there is no doubt that this method of culture could be successfully used for supplying Rickettsiae in sufficient quantities for large scale production of vaccine against epidemic typhus fever.

A full description of the technique employed is given. D H

TEHANG (J) & MATHEWS (G B.) Anti-Typhus Vaccine prepared from *Rickettsia prowazeki* cultivated in the Yolk Sac of the Developing Chick Embryo.—*Chinese Med J* 1940 Oct Vol. 58 No. 4 pp 440-445

An account is given of the methods employed in preparing vaccines of *R. prowazeki* (Chinese strain) from cultures in the developing chick

embryo. Eggs are incubated at 37°C for 10 days and are then inoculated with the virus from the brain of an infected gumeapig and incubated again for 5 days. The infected egg sac is used for further inoculations and a vaccine is prepared from those eggs which show the heaviest infection with *Rickettsiae*. This vaccine is standardized by comparison with the numbers of *Rickettsiae* found in infected intestines of lice. A dose equivalent to that in 100 intestines is employed in the inoculation of men. Gumeapigs inoculated with this vaccine in a dose equivalent to that in 10 louse intestines showed a solid immunity to infective doses of typhus virus. The vaccine has also been used in the inoculation of man and more than 40 persons have been so treated.

D H

KUROTSCHKIN (Timothy J) & WYCKOFF (Ralph W G) Immunizing Value of *Rickettsial* Vaccines.—*Proc Soc Experim Biol & Med* 1941 Feb Vol. 46. No 2. pp 223-228

Comparative studies were made of two methods of preparing vaccines from a virus of Rocky Mountain fever of low virulence—A By Zinsser's method of culture on agar slopes. B By Cox's method of culture in the yolk sac of the developing chick embryo.

The vaccines were then compared as to immunizing power and the relative merits of the two methods for the large scale production of vaccines.

It was found that both vaccines protected in about equal degree but the Cox's egg method was easier to carry out and was less costly in time and in materials. The same result was obtained when more virulent strains of the virus were used and also with the virus of epidemic typhus.

D H

HEASLIP (W G) An Investigation of the Condition known as Coastal Fever in North Queensland Its Separation from Scrub-Typhus—*Med Jt Australia* 1940 Nov 30 27th Year Vol. 2. No 22. pp 555-564 With 3 charts & 1 map [21 refs]

This paper commences with a review of the literature dealing with the local fevers in Queensland. The researches reported deal with these fevers and are divided into two parts: first the investigation of scrub typhus or tsutsugamushi fever and the isolation and investigation of the virus; second to identify if possible the cause of the so-called coastal fever and to separate the two diseases. For this purpose mice were employed and blood clot from patients suffering from coastal fever was inoculated intraperitoneally into these animals. The first 14 patients examined gave no result: the mice apparently being in no way affected and there were no agglutinins for *Proteus OXA* in serum of patients but case XV proved to be one of scrub typhus. The serum of this patient agglutinated *Proteus OXA* in a dilution of 1/2560 and the mice inoculated with blood clot died after about 10 days. *Rickettsiae* were seen in smears from the exudate from serous membranes. This virus was passed in series through mice and by this means was sent to Adelaide in S Australia. It is interesting to note that in the laboratory there one of the workers became infected with typhus from this same virus some months later thus completing the chain of evidence.

Investigation of coastal fever. As already stated when mice were inoculated with the blood of patients who were suffering from coastal

fever only these animals did not die but when these mice were killed and examined they showed infection with a bipolar Pasteurella-like bacillus which was frequently associated with a large Gram-positive bacillus. The spleen and liver of the mice were enlarged and there was a deposit of fibrin on the surface of these organs. It was not found possible at this time to cultivate the organism from the mice. Those mice which had recovered from the injection of "coastal fever" blood were found to be susceptible to the virus of the local form of endemic typhus. It was also found that mixed infections with coastal fever and endemic typhus were common. For instance in one case blood drawn from a fever patient and allowed to remain at room temperature gave a pure culture of the pleomorphic bacillus in the serum. When the serum was inoculated into mice they died in ten days with symptoms of typhus and Rickettsiae were demonstrated in smears from the organs. At the same time a guinea pig inoculated with the blood died in 24 hours from the bacillary infection. The patient's serum agglutinated *Proteus* OVK up to 1:5,200. It was later found that in cases of coastal fever or in mixed cases of scrub typhus and coastal fever a pure growth could be obtained in the patient's blood if kept at room temperature and from these cultures subcultures could readily be made on or in the usual culture media.

A full bacteriological investigation of this bacillus is being made. It is apparently related serologically to the anthrax group and is being reported upon later.

In 19 cases of typhus the bacillus was found in 11 but it is emphasized that this double infection only occurs in strictly localized districts where coastal fever also is met with. An examination of bandicoots and rats, which had been caught in or near swamps where cases had been infected was made. 70 rats and 7 bandicoots were examined and over 70 per cent showed infection with a bacillus similar to that isolated from the blood of the patients suffering from coastal fever. Reasons given for considering that the organism is the cause of coastal fever are as follows—

1. The bacillus is constantly found in the blood of patients showing the typical signs and symptoms of coastal fever in direct smears and also in pure culture in serum at room temperature.

2. Monkeys can be infected and the bacillus isolated from their blood.

The most likely vector is a larval mite which also probably carries the virus of scrub typhus from the rat or bandicoot, hence the double infection in people working in these localities.

3. It has been shown that cases of typhus comprise only a small percentage of the previously undiagnosed fevers of North Queensland.

4. After other known conditions have been separated, the residue of the cases of coastal fever appears to constitute a single disease entity. The main signs and symptoms of the condition are pyrexia, adenitis, headache, nausea, weakness, sore throat and loss of weight.

5. Transmission appears to be by a vector which may be a mite, mosquito or tick.

6. From patients presenting the clinical signs and symptoms listed above an organism which is a member of the anthrax group has invariably been isolated. This organism appears to be the causal agent of the disease but it is also found in the blood in cases of typhus. It is present in 70 per cent. of captured rats and bandicoots.

7. The organism is pleomorphic, but is usually seen as a Gram-negative bacillus showing bipolar staining, or a Gram-positive anthrax-like

bacillus. It grows readily on or in artificial media at temperatures between 20° and 30°C. but will not multiply appreciably at 37°C. when the media are directly inoculated with patients blood.

D H

WEINMAN (David) *Bartonellosis a Public Health Problem in South America.*—*Rev Med Trop & Parasit.* Habana. 1940 Sept-Dec. Vol 6 Nos. 5 & 6 pp. 277-281 [15 refs.] Also in *Jl Trop Med & Hyg* 1941 May 15 Vol 44 No 10 pp 62-64 [15 refs.]

In Colombia bartonellosis has recently reached epidemic proportions and has caused a marked increase in the death rate in the State. Oroya fever is the most common form but verruga has also been observed the parasite has been demonstrated in and has been cultivated from the blood of fever cases. In one department of about 100 000 inhabitants there were 4 000 deaths from the disease. It has recently been shown that the parasite of the disease may be present in the blood of convalescent carriers and also in healthy people who have never had the disease and infection therefore may readily be carried from one district to another. In Colombia, body lice and ticks are suspected of carrying the disease. The disease is not confined to areas where sandflies are found as it is in Peru. The Columbian *Bartonella* is said to be pathogenic for guinea-pigs whereas the Peruvian parasite is not. Bartonellosis now constitutes a major health problem in South America. [See also this *Bulletin* 1940 Vol 37 pp 271 582-584 1941 Vol 38 p 209]

D H

RAY (H N) & IDNANI (J A.) *Observations on Bartonellosis in Dogs in India.*—*Indian Jl Vet Sci & Animal Husbandry* 1940 Sept Vol 10 Pt. 3 pp 259-270 With 2 figs. (1 coloured) on 1 plate & 1 chart. [40 refs.]

A résumé of the knowledge of *Bartonella* is given and the disease produced by *B. canis* in dogs in India is described in detail. The presence of *B. canis* in dogs produces a progressive and fatal anaemia accompanied by high fever. The morphological characters of the parasite are fully described.

D H

JIMINEZ (Jose F) & BUDDINGH (G John) *Carrion's Disease. II. Behavior of Bartonella Bacilliformis in the Developing Chick Embryo.*—*Proc Soc Experim. Biol & Med* 1940 Nov Vol. 45 No 2. pp 546-551 With 3 figs

The observations reported in this paper indicate that *Bartonella bacilliformis* (4 strains were tested) is readily cultivated within the allantoic fluid of the developing chick embryo maintained at room temperature 25° to 28°C. The growth in this environment is much more rapid and more abundant than in any of the artificial media so far employed. It was also found that the allantoic fluid by itself is a suitable medium for the growth of this micro-organism *in vitro*. The first passage of the organism from artificial media induces the development of a granulomatous lesion bearing a close resemblance to that of the human cutaneous infection (verruca). In these lesions the presence of *B. bacilliformis* can be readily demonstrated. It has not yet been found possible to carry the growth beyond the first passage in the chick embryo fluid.

D H

GUILDY REPORT OF THE KING INSTITUTE FOR YEAR ENDING 30th SEPT 1939 pp 34-37—Sandfly Fever Enquiry under the Director King Institute, Gwinda [ANDERSON (W M E) PANDIT (C G) SANJIVA RAO (R) & SHORTT (H E)]

The life history of *P. papatasi* has been further studied in the field in the Punjab. Experiments were carried out to test the effect of various insecticidal solutions and satisfactory results were obtained with several of the kerosene base solutions. Sera from convalescents were collected, dried and despatched to the King Institute Madras for testing. Seventy of these sera were tested on the spot and the presence of virus was detected in 40. D H

GUTHRIE (Peter H.) Hans Zinsser and his studies on Typhus Fever—*Jl Amer Med Assoc* 1941 Mar 8 Vol 116 No 10 pp 807-912.

BLUMER (George) The Rickettsial Diseases, with Special Reference to those of Importance along the Atlantic Seaboard.—*Bull New York Acad Med* 1941 Apr 17 Vol 17 No 4 pp 280-294

LEPROSY

PRICES OF ABSTRACTS IN THIS SECTION

VICKERS (p 456) describes the first case of leprosy in the Royal Navy to be recorded for 100 years.

HAYWARD (p 456) reports on a leprosy survey in Rajputana, where an incidence of 0.08 per cent was found. This is low but the proportion of lepromatous cases was relatively high. For control he advocates the institution of small colonies in the villages, and treatment at existing hospitals and dispensaries. DE SNEOV (p 456) shows that in Ceylon most of the cases are found in the densely populated and humid areas near the coast. Surveys have increased the number of known lepers and a large proportion of these are now isolated. Contact examination and supervision of the patients are now provided for.

MALANHOLO (p 457) has studied leprosy in a village near Batavia, in which the incidence is high though the disease is benign in character. There is a high incidence in contacts. The author attributes the mildness of the disease to the fact that the people are well fed and not subject to epidemic diseases.

VAN HOOB (p 457) gives figures of the cases treated in the Belgian Congo during 1939 and indicates the measures taken to control the disease.

DEGOTTE (p 458) reports on a survey in the Belgian Congo, where the high rate of 5.29 per cent was found. In areas where village isolation has been well carried out the incidence is much smaller than where this is not the case and segregation is therefore considered to be the best method of control in this area.

HASSETTINE (p 458) suggests that the men admitted to the U.S. Marine Hospital, Louisiana, with leprosy during the last 20 years were all infected in childhood since all were born in the Southern States, in which leprosy is endemic.

Analysing leprosy in Rio de Janeiro ARAUJO and DE ALBUQUERQUE (p 458) point out that the age of onset in foreigners is commonly over

20 years whereas in Brazilian natives the incidence rate below that age is much higher. Adult foreigners are at least as susceptible to the disease as Brazilian children.

COLLIER (p 459) gives details of the results of experiments in which pieces of human lepromata were planted beneath the skin of monkeys which had been given a diet of Colocasia over long periods. Four of the animals developed symptoms similar to those of leprosy in man and in some of them skin snips from the ears and nasal smears were positive for acid fast bacilli. OTA and NITTO (p 461) have successfully transmitted material from human lepromata in seven passages through fowls. Details of technique are given. Lesions rich in acid fast bacilli and containing round cell infiltration and large vacuolated cells with enclosed bacilli were demonstrated. These lesions increased in degree and in rapidity of development in the later passages.

EVANS (p 461) reports failure to cultivate *Mycro leprae* on a number of media.

TORSSUJEW (p 462) describes the degenerative changes found in nerve tissue in leprosy which are similar even in the most diverse forms of the disease.

OTA and NITTO (p 462) have used infected fowl muscle as antigen for the Mitsuda reaction with results almost equal to those obtained with human lepromin.

IGARASHI and HAYASHI (p 463) give information on the progress of patients who ten years ago gave atypical Mitsuda reactions. They point out that a negative result to the test is often the prelude of relapse. The influence of sex in relapse is discussed.

MALTANER (p 463) finds that the sera of lepers react to a high degree with antigen from tubercle bacilli in the complement fixation test but very little with a syphilitic antigen in the absence of syphilis.

SOETOPO (p 464) describes the condition of a patient in whom the lepra reaction assumed various forms engorgement a generalized rash and even bulla formation. There was abscess formation in which no bacteria other than leprosy bacilli were found, and the author considers that *Mycro leprae* can itself cause suppuration in some circumstances.

WADE (p 464) discusses relapse in tuberculoid leprosy but remarks that it is rare for this form to be transformed into the lepromatous type. COCHRANE (p 464) also considers that lepromatous disease does not originate from tuberculoid lesions but may originate from what he names intermediate lesions. He gives a table in which the characters of tuberculoid and intermediate lesions are described.

PRENDERGAST (p 465) has studied the eyes of lepers in the United States. Negroes seem to be specially susceptible to ocular complications of which the commonest is infiltration of the deep layer of the cornea. The iris is also frequently attacked but lesions of the retina, optic nerve and lens are rare. Methods of treatment are discussed.

TISSEUIL (p 466) reports favourably on the intra arterial injection of chaulmoogra oil in the treatment of perforating ulcers. DAVISOV (p 466) has used Grasset's tubercle endotoxoid with some benefit in neural cases of tuberculoid type. COLLIER (p 467) reports on the use of diathermy in leprosy. It was applied over the kidney with a view to stimulation of the suprarenal and produced considerable improvement in a number of cases especially in the reduction of the frequency of lepra reactions. The theoretical basis of the treatment is discussed.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. Report for 1940—
24 pp. With 1 fig. London 25 Kidderpore Avenue N W 3

VICKERS (H. R.) A Case of Leprosy.—*Jl Roy Nav Med Serv* 1941
Jan. Vol. 27 No. 1 pp. 87-90. With 2 figs

This case is of interest as the first recorded case in the British Royal Navy in the last one hundred years. The patient, with forty years service, developed maculo-anaesthetic lesions, negative to lepra bacilli, shortly after a nervous breakdown. He had served for several years on the China station not long before but the source of his infection could not be traced. The prognosis is good. L. ROBERT.

HAYWARD (E. W.) Report on the Leprosy Survey of Jodhpur State
1937 to 1939.—*Leprosy in India* 1940 Oct. Vol. 12 No. 4
pp. 133-146

This is a report of a survey of the largest of the Rajputana States of Central India, which has a comparatively low rainfall. The census of 1931 returned only 11 cases and the hospitals showed few attendances for leprosy. The propaganda, survey and treatment method was carried out from 1937 to 1939 and the examination of 940,575 persons revealed 388 cases in 1,029 villages. This gives the low rate of 0.08 per cent., with 43.61 per cent. of lepromatous cases, which is an unusually high proportion for India. The age incidence was also peculiar in showing only 5.4 per cent. of cases up to 14 years of age and 57.8 per cent. from 40 years upwards. The high proportion of males found is attributed to the difficulty of examining females owing to the purdah system. The authors consider that the disease is not decreasing and that the total number of cases in the State is between 2,000 and 3,000 the isolation of which is beyond the resources of the State so they advise small colonies in the villages and treatment as out-patients at the existing hospitals and dispensaries. L. R.

DE SILVA (D. S.) Leprosy and its Control in Ceylon.—*Jl Ceylon Branch Brit. Med Assoc* 1940 Sept. Vol. 3 No. 3
pp. 171-191 With 1 map 1 diagram, 3 charts & 9 figs. on 3 plates. 7 refs.

This paper deals with the progress that has been made in Ceylon since in 1902, sole reliance on a compulsory segregation gave place to modern methods. Surveys showed that 85 per cent. of cases were found within five miles of the humid coast, which is the most densely populated part. The survey was followed by propaganda for education of the people, training of medical officers in early diagnosis and the establishment of out-patient clinics for the treatment of non-infective cases. Leprosy hospitals and settlements were established, arrangements made for repeated examinations of all contacts and supervision of discharged negative cases and those permitted home isolation. The known number of 557 cases in 1921 was raised by 1939 to 3,648 of which 2,549 were found by the surveys. 1,031 infective cases are now isolated. Modern treatment is expected to restore the health of the majority of the early cases and to reduce the number of infective cases. L. R.

MALAIHOLLO (J F) *Lepre in de desa Wates (Res Batavia en het resultaat van een bloedgroeponderzoek onder leprozen en gezonden in Wates en Blora [Leprosy in Wates, Batavia.]—Geneesk Tijdschr v Nederl-Indië 1940 Sept. 24 Vol. 80 No. 39 pp. 2296-2312. With 1 map & 1 fig English summary*

1 A leprosy survey is carried out in Wates a village in the Regency of Mr Cornelis (Province of West Java) In 1937 the density was 30 pro mille in 1939 38 pro mille (population of Wates 1661)

This very high density of the disease is probably ascribable to frequent and long lasting contact resulting from the light-heartedness with which the population accepts the presence of the disease Frequent and long lasting contact cause a high disease-rate (BITANALA, Cairo Congress 1938)

2. The endemic at Wates is benign we found mostly light N-cases (70 per cent. N_1 and 14 per cent. N_2)

The benign character of the endemic is probably due to the good general physical condition of the population.

For the continuation of this favourable aspect it will be of great importance that there is neither scarcity of food nor any epidemic (malaria dysentery etc) in Wates.

3 The experience in other regions shows that in the first stage of a leprosy endemic we find preponderantly C-cases

In Wates however where leprosy has existed for about 30 years the C-cases are scarce (11 per cent.)

4 Comparing the results of the surveys in 1937 and in 1939 it seems to us that leprosy at Wates is still spreading

5 An intensive anamnestic inquiry into relationships among the lepers results in a high rate of housemate infection cases (52 per cent.)

6 Chaulmoogra treatment was given during two years Disappearance of lesions in 7 cases and improvement in 8 cases indicate that chaulmoogra treatment is of great value

7 A small number of patients have already on their own initiative come to house-isolation and propaganda for this idea may be expected to yield further results

8 Blood grouping of lepers and non lepers in Wates and Blora showed no difference in blood group rates.

There is no relation between blood group and type of leprosy

CONGO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE PENDANT L'ANNÉE 1939 [VAN HOOF (L.) pp 48-53 —Lèpre [Leprosy]

During 1939 74 397 cases of leprosy were treated throughout the Colony 6 new European cases were diagnosed. About 10 000 fresh cases were discovered, especially in the Provinces of Coquilhatville Costermansville and Elisabethville in surveys made by the *Fondation Père Damien* Preventive measures include classification of lepers Isolation of infective cases and intensive treatment of those who are likely most to benefit from it Segregation is at present only partially employed and will be improved as time goes on and as the natives themselves recognize its value. Isolation villages of not more than 400 inhabitants are aimed at these villages have land for agriculture

dispensaries and hospitals and are able to subsist on their own resources. They are administered according to local custom. Tables of the numbers of patients in the lepro-saria of the various provinces are given

C II

DEGOTTE (J.) Epidemiological Leprosy Survey in the Nepoko, Kilali-Ituri District, Belgian Congo. With an Introduction by A. DUPONIS.—*Internat JI Leprosy* Manila. 1940. Oct.-Dec. Vol. 8 No 4 pp. 421-444 With 6 figs (1 map)

This survey was part of the Belgian Congo plan of examining the whole of the population in certain areas for sleeping sickness and other diseases. The area is a tropical one with high rainfall, so it is not surprising that the high leprosy rate of 5.29 per cent was found among the 38,120 persons examined who included 37,442 of a Bantu race and 678 pygmies. The latter showed the still higher figure of 7.07 per cent. The age incidence of the total cases showed only 10.35 per cent. from birth to the 20th year of age, 73.41 from 20th to 50th years, and 16.24 per cent. above 50 years of age. Lepromatous cases formed only 8.61 per cent. of the total, Nt and NT cases of the Cairo classification 14.95 per cent. and the remaining 76.44 per cent. were Na and Na-cases. It is noteworthy that in 43 per cent. of the foci the appearance of lepromatous cases had soon been followed by an extension of the disease. Microscopical examinations were found necessary for the discovery of diffuse lepromatous cases. In areas in which village isolation had been relatively well carried out the cases were only about one-third as numerous as where the reverse was the case. Segregation is therefore considered to be the best method of combating leprosy in this area of the Belgian Congo.

L. R.

HASSELTINE (Hermon E.) Leprosy in Men who served in United States Military Service.—*Internat JI Leprosy* Manila. 1940. Oct.-Dec. Vol. 8 No 4 pp. 501-508

The author has tabulated the cases of leprosy admitted to the U.S. Marine Hospital at Carville, Louisiana, during the twenty years 1921-40 among former military service men dating back to Spanish War Veterans. As they were all born in the leprosy infected Southern States it is suggested that most of them contracted the disease in childhood before entering military service.

L. R.

ARAÚJO (H. C. de Souza) & DE ALBUQUERQUE (A. F. Rodrigues) Alguns aspectos epidemiológicos da lepra no Brasil. A lepra na cidade do Rio de Janeiro (Leprosy in Rio de Janeiro).—Reprinted from *Ata Médica*. 1940 Aug. Vol. 6 No. 2 pp. 63-80 English summary

"Sexual incidence.—Out of 528 lepers whose register cards we are analysing 282 or 53.4 per cent. were of the male sex, and 246 or 46.6 per cent. of the female sex, giving a ratio of 1.14 men to 1.0 woman.

"This ratio does not reflect the real situation of leprosy in the whole of Brazil not even in any of its States. This ratio for native Brazilians 1 of one man to one woman, among Brazilians born of foreigners 1.55 to 1.0 and among foreigners of 2.436 to 1.0 woman. This latter ratio is accounted for by the predominance of male immigrants

Racial incidence—Out of 528 leper records studied 431 or 81·6 per cent. are of the white 56 or 10 per cent. are mestizoes and 41 or 7·7 per cent. of the negro race. All foreign lepers are of the white race.

Age incidence—The onset of leprosy in the three groups of patients took place at the following ages.

Age	Groups of patients		
	A. Native Brazilians	B Brazilians born of Foreigners	C. Foreigners
From 0 to 20 years	37·9	45·0	5·0 per cent
From 21 to 50 years	52·2	46·0	62·2
Above 50 years	9·8	9·0	32·7
	99·9	100·0	99·9

As may be seen 94·9 per cent. of foreigners had the outbreak of leprosy after the 20th year of age. This fact proves that the grown up immigrants coming from European countries where leprosy is no more endemic, are as susceptible as or even more susceptible than Brazilian children descending from Brazilian native parents to leprosy infection.

Civil state—Out of 528 lepers of these statistics 243 or 46 per cent are married 161 or 30·5 per cent unmarried, 77 or 14·6 per cent. widowed and 47 or 8·9 per cent younger than 15 years.

Occupation—Out of 528 lepers 483 or 91·5 per cent. carry on various occupations as follows. Housekeeping 160 (30·3 per cent) workmen 101 (21 per cent.) trade 48 (10 per cent.) chambermaids 28 (5·4 per cent.) civil service (for the most part railway men of the Central Railway of Brazil E.F.C.B) 23 (4·7 per cent) school boys and girls 23 (4·7 per cent) agricultural labourers 21 (4·3 per cent) carpenters 16 (3·3 per cent) motorcar drivers 14 (2·6 per cent) tailors 10 (2·1 per cent.) soldiers 8 (1·7 per cent) washerwomen 7 (1·4 per cent) sailors 4 (0·8 per cent.) hairdressers 3 (0·6 per cent) schoolmasters 2 porter 1 and without occupation 45 or 8·5 per cent.

DE SOUZA ARAUJO (H. C) Infection of the Hamster (*Cricetus cricetus*) with Human Leprosy, with *Bacillema*.—*Internat Jl Leprosy* Manila. 1941 Jan.-Mar Vol 9 No. 1 pp 63-68 With 2 figs. on 1 plate

[See this *Bulletin*, 1941 Vol. 38 No 4 p 218.]

COLLIER (D R) Inoculation of Monkeys with Leprosy, following a Diet of Puak (*Colocasia*).—*Thai Sci Bull* 1940. Vol. 2. pp 101-108. [Summary taken from *Internat Jl Leprosy* Manila. 1940 Oct-Dec. Vol. 8 No 4 pp 549-550 Initialled H W W]

Following the ideas of Oberdoerffer the author undertook an inoculation experiment with monkeys—the ordinary long tailed brown

Rhesus native to the country—fed chiefly on *puak* (*laro*). The tubers were given boiled, as they were rejected when raw. Starting with two animals the number had been increased to 30 at the time of the report, but in most of them the experimental period had been too short for results to be evident only 12 are referred to specifically four of them controls not given the colocasia diet. Four of the animals whose postinoculation period was six months or more had developed "symptoms similar to those seen in leprosy in humans" a fifth one, similarly treated remained negative. Another one which was given injections of a sapotoxin from colocasia as well as that vegetable for food, developed abscesses containing acid-fast bacilli as well as other symptoms. The following is taken from the notes on the more interesting animals. No 1 Diet started September 1st, 1938. On October 1st a piece of a leproma was inserted under the skin of the back. In six weeks there developed inflammation of the face, palms and soles face deep red, somewhat swollen and infiltrated inoculation lump more than doubled in size. This reaction subsided after about a month but the thickening and redness of the face remained since then it has been highly inflamed at times and has never returned to normal. On March 1st 1939 a smear from the nodule on the back showed typical acid-fast bacilli. Animal reinoculated on April 17th. Ear clips on May 20th and 30th negative but a nasal smear was positive on the latter date and repeatedly thereafter. On July 24th an ear clip was positive and this part has remained so ever since. In October a year after the first inoculation, a diffusely swollen area of deep red coloration appeared across the back to the level of the lumbar vertebrae smears negative. Ears, and also nipples, red and definitely enlarged. No 3 Inoculated December 15th, 1938 reinoculated April 17th, 1939. On June 29th and September 27th nasal smears positive ear clip negative. In September the face around the eyes became intensely red and indurated. This condition which has persisted, has not been noted in any of the control monkeys. No 7 Inoculations as with No 3 having resulted in no skin changes, a third one was made on August 4th. An abscess formed locally smears showed extremely numerous acid-fast bacilli. This lesion healed spontaneously within 9 days. On September 27th there was found on the opposite side of the back a large soft fluctuating mass 1×0.75 inches, from which was aspirated a purulent fluid which contained acid-fast bacilli. The mass remained indurated and has persisted. Similar though smaller masses occurred on both wrists. There has been loss of hair on the back and tail. Face unchanged, but the nasal smear has been positive. On November 1st ulnar nerves found enlarged. No 11 Inoculated as usual August 5th beginning September 14th this animal was given a number of injections of sapotoxin prepared from colocasia. By October 1st there was on the opposite side of the back a mass which by November 1st measured approximately 1×0.75 inches and that contained acid-fast bacilli. A second mass, also containing such bacilli, has appeared below the first one. Eye-brows thickened and somewhat reddish with indications of paresthesia around the eye. Loss of hair over back and tail. Highly interesting photographs of some of these animals are reproduced. Rabbits guinea-pigs and ordinary pigs have also been experimented with one of the last developed a leprous lump. [In correspondence the author states that the animals have continued to develop new lesions.]

OTA (Masao) & NITTO (Shunichi) Durch Sieben Passagen hindurch ohne ausnahme Gelingen Uebertragungen von menschlicher Lepra bei Hühnern. [Successful Transmission of Human Leprosy through Seven Passages in Fowls]—*Japanese Jl Experm Med* 1940 Oct. 20 Vol. 18, No 5 pp 327-344 With 8 figs (4 coloured) on 2 plates [19 refs]

This is an important paper describing a method of uniform infection of hens with human leprosy material in continuation of previous work. [See this *Bulletin* 1940 Vol. 37 p 628]

The authors have found hens the most suitable animals of many they have tried for producing infection by injection of human leprosy material into the breast muscles. In the vast majority of the birds more or less extensive granulomata result with the macroscopical appearances of orange coloured spots or lines which are usually very rich in acid fast bacilli. The results however are not certain and passages to other animals are not possible.

By using for injection 0.5 gm of the deposits of lepromata, mixed with a standard rice mixture uniform success was obtained and passages were successful. By injecting 0.5 gm of leproma deposit in 5 cc physiological salt solution with 0.05 gm of Kieselguhr trypan blue and potassium iodide deep into the small pectoral muscle of hens and making a control injection without the leprosy material into the muscle of the other side the following results were obtained — After three or four months the control injection had become completely absorbed and the muscle was normal. In strong contrast were the changes in the infected muscle for its surface showed yellow spots fairly closely distributed and the muscle tissue similar yellow spots and lines. A very rich occurrence of acid fast bacilli could be demonstrated in the affected tissues. Dark blue specks of trypan blue were also visible. These changes persist over a year and even appear to increase slowly. With increasing number of passages the lesions also develop more quickly. Injections of the diseased tissue into guinea pigs were negative to the tubercle bacillus nor could the acid fast bacilli be cultivated on media suitable to the latter organism. Microscopically both small-celled infiltration and large vacuolated cells containing acid fast bacilli were demonstrated. The successful passage of the infection through a series of seven birds with increasing degree and rapidity of development led the authors to consider that their method of regular infection of hens with human leprosy material furnishes the essentials for chemotherapeutic experiments to find a more effective treatment of the disease. A black and white and a coloured plate well illustrate the conditions described.

L R

EVANS (Florence L.) Attempted Cultivation of *Mycobacterium leprae*—*Internat Jl Leprosy* Manila. 1940 Oct-Dec Vol. 8 No 4 pp 481-493 [35 refs.]

As the results of this investigation were negative it will suffice to mention that the media used were prepared with legumes milk egg or egg yolk or various combinations of them. Minced chick embryo Corper's potato medium dextrose broth or dextrose brain semi-solid agar also failed.

L R

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TOSSUJEW (N. A.) Morphologic Changes of the Cutaneous Nerves in Leprosy.—*Internat J Leprosy*, Manila 1940 Oct.-Dec. Vol 8 No. 4 pp. 467-490 With 8 figs. on 2 plates.

After a discussion of some of the earlier literature the author records and illustrates his own observations on this subject.

In the most varied manifestations of leprosy a similar picture of nerve degenerative changes are found. The few nerve fibres found in the subcapillary layer nearly all show on impregnation with silver thickening with fragmentation of the cylindrical segments with tumefaction and infiltration of the nerve sheaths. Similar changes are met with in the nerve fibres in the remnants of sweat and sebaceous glands. In the lower layers of the epidermis may be found a mass of large round sac-like bodies without projections or nuclei. These changes are more developed in leprous granulomata than in the infiltrated macule. After the disappearance of the leprous granulomata the nerve elements are decreased in the atrophied skin. The lamellae of the Pacinian corpuscles are shrunken and may be entirely lacking in nerve fibres. L. R.

LOWE (John) & DHARMENDRA Studies of the Lepromin Test. A Review of the Literature and a Discussion of the Lines of Future Work.—*Leprosy in India* 1940 Oct. Vol. 12 No. 4 pp. 121-137 55 refs

This is a useful review of the literature of the Mitsuda or lepromin test with numerous references which will be useful to other workers. They suggest further work to standardize the substances used, and to study the nature of the resulting reactions and the significance of positive and negative reactions. L. R.

OTA (Masao) & NITTO (Shunichi) Ueber Mitsudache Reaktion, Angestellt mit einem Antigen aus Leprosen Gewebe von mit menschlicher Lepra infizierten Hühnern [The Mitsuda Reaction with Infected Fowl Tissue as Antigen].—*Japanese J Experim Med* 1940 Oct 20 Vol. 18 No. 5 pp. 345-351 With 4 figs. on 1 plate

The authors record results with the Mitsuda reaction, using as antigens the tissues of hens infected by the method described in a foregoing abstract (p. 461). In table I they record the results of using ordinary leprous nodule emulsion (L.A.) in comparison with extracts of the diseased muscle containing numerous acid-fast bacilli (AI) and of the liver with few or no such bacilli (AII) obtained from one of their second passage infected hens. Another set of antigens was prepared from a fifth passage hen with the addition of one from the spleen tissue. The tests were carried out in various types of leprosy, and in controls with results almost equal to those of the original Mitsuda reactions. The tests with the fifth passage animal tissues were the stronger of the two series, including that prepared from the hen's spleen. L. R.

IGARASHI (Masa) & HAYASHI (Fumio) Observation of Patients with Atypical Mitsuda Reactions, after an Interval of Ten Years — *Internal J'l Leprosy* Manila 1940 Oct-Dec Vol 8 No 4 pp 457-464 With 1 fig

This is an interesting report on subsequent observations on cases that gave atypical Mitsuda reactions ten years previously. It is best summarized in the authors' own words —

- 1 Of a total of 35 improved lepromatous cases the lesions of which had been resolved long before the tests were made and which gave positive reactions 28 or 80 per cent have remained well, without relapse
- 2 The other 7 cases of this original group (20 per cent.) have relapsed the Mitsuda reaction of course becoming negative. This observation answers the hitherto unsettled question of whether or not improved lepromatous cases that give positive reactions may undergo relapse
- 3 Of a total of 11 similarly improved lepromatous cases that gave only weakly positive (\pm) Mitsuda reactions only 5 have relapsed. The other 6 have unexpectedly remained without further symptoms, indicating an about even chance of favourable outcome in such cases
- 4 Most of the lepromatous cases with resolved lesions that gave negative Mitsuda reactions have relapsed. Such cases are regularly of poor prognosis
- 5 Three neural cases whose reactions were repeatedly negative have all relapsed. It is noteworthy that this significant result of this test precedes by a considerable time the unfavourable turn of the clinical course
- 6 One neural case with a typical positive reaction that has, nevertheless become lepromatous is mentioned
- 7 The element of sex appears to have influenced the outcome of these cases. (a) Among the resolved lepromatous cases with positive reactions that have not relapsed are 12 males and 16 females a ratio of 1.33 which is in contrast with the usual ratio of 2.1 to 3.1 among leprosy cases in general. (b) On the other hand the 7 cases of this category that have relapsed are all males. (c) The six resolved cases with weak reactions that have not relapsed are all females but all cases with that grade of reaction were of that sex. (d) The three neural cases that had negative reactions and that relapsed were all males. Even as males predominate numerically among leprosy cases in general, and among female cases the neural type is relatively predominant so in the cases the subject of this study there is evidence that the prognosis is more favourable and the disease process more stable among females than among males. L R

MALTANER (Elizabeth) A Study of the Sera of Lepers in Quantitative Complement-Fixation Tests for Syphilis and Tuberculosis. — *Amer J'l Trop Med* 1940 Nov Vol 20 No 6 pp 843-848 [13 refs]

This paper confirms previously reported positive complement fixation reactions of the sera of lepers with tubercle antigen and demonstrates a high degree of reactivity. In the case of the test for syphilis contrary to the findings of others the reactivity of the leprosy sera was practically absent and when definite reactions were obtained syphilis could not be excluded. L R

August, 1941

Tropical Diseases Bulletin.

castro (M.) Een atypisch beloop der lepra-reactie. [Atypical Leprous Reaction.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Nov. 28. Vol. 80. No. 48. pp. 2801-2808. With 1 chart & 2 figs. on 1 plate. English summary

The patient was an Indo-European, 28 years of age, who developed unusual types of leprosy reaction. His disease had started some 13 years earlier. He showed from time to time a leprosy reaction which varied. Thus, in June 1938, it showed itself as engorgement of the nodules present. In September it was evidenced by a generalized rash, painful and resembling erythema nodosum, each spot being topped by a vesicle. In the following July he had another attack this time bullae becoming postular like impetigo contagiosa and bristly, and abscess formation occurred. In the leucocytes and lepra cells acid-fast bacilli were present, but attempts at cultivation proved negative. The author states that this case confirms the belief of STEIN and KAYLE that *Mycobacterium leprae* can, in certain circumstances cause suppuration. The first and third of these are mentioned by ROGERS and MUMFORD in their book on leprosy. The second must be more rare. H H S

WADE (H W.) Relapsed and Borderline Cases of Tuberculoid Leprosy.—*Leprosy Review* 1941 Jan. Vol. 12. No. 1 pp. 3-17. With 10 figs. 24 ref.

This illustrated paper discusses relapses and transformations in the tuberculoid form of leprosy. Of 12 bacteriologically positive cases followed up in the Philippines seven relapsed, and brief details of these are recorded. Similar occurrences have been reported from Calcutta and elsewhere. It is, however, rare for this type to be transformed into the lepromatous form and this did not occur in any of the Philippine cases cited, although in two of them activity persisted for three years. The more numerous lepra bacilli during a relapse may cause the lepromatous stage to be suspected. The author concludes that the transformation of a tuberculoid case is not readily accomplished and caution must be exercised in diagnosing it. L R

COCHRANE (R G.) Development of the Lesions of Leprosy with Particular Reference to Tuberculoid Leprosy and the Significance of the Lepromin Test.—*Internist J. Leprosy* Manila 1940. Oct.-Dec. Vol. 8. No. 4. pp. 445-458. With 24 figs. on 6 plates & 1 text fig. [12 refs.]

This worker also discusses the possibility of the transformation of tuberculoid cases into other forms. He doubts whether those that became lepromatous were really tuberculoid in the first instance because they were consistently negative to lepromin, so he classifies them as an intermediate variety. He goes on to describe as "basic lesions" what he calls incipient lesions of childhood, simple macular lesions and tuberculoid macular lesions, and illustrates his ideas of their development and transformations in an elaborate diagram which should be consulted by those interested in such theoretical

conceptions. He summarizes his description of major tuberculoid and intermediate lesions respectively in the following statement —

Tuberculoid Cases

Lesions Raised erythematous and infiltrated with sharply defined edges which remain distinct, even when they extend

Reactive stage Considerable tenderness of lesions Febrile period if any of short duration Emaciation seldom marked and patient rarely so ill as to need hospitalization

Bacilli Lesions positive usually becoming negative within six months

Histology The granuloma usually extends to the epidermis with no sub-epidermal clear zone Giant and epithelioid cells well marked. No foamy cells.

Leprosin Reaction positive
Nerve abscess Common.

Intermediate Cases

Raised erythematous lesions with a more succulent appearance edges while infiltrated tend to be less well defined

During reactive stage marked burning and tenderness of lesions which may ulcerate With fever sometimes prolonged and emaciation patient may appear extremely ill and often requires hospitalization

Positive not becoming negative in less than 9 to 18 months.

The granuloma tends to respect the subepidermal zone where dilated capillaries are frequently seen. Tuberculoid structure not so obvious giant cells tending to be fewer or smaller and may be absent. Foamy cells not in frequently seen sometimes in the same field as giant cells

Reaction negative
Abscess unusual

L R

COCHRANE (R. G.) & SLOAN (T. B. M.) *Tuberculoid Leprosy affecting the Palpebral Portion of the Lacrymal Gland.*—*Leprosy in India* 1940 July Vol. 12, No. 3 pp. 83-84 With 3 figs on 2 plates.

PRENDERGAST (J. J.) *Ocular Leprosy in the United States.*—*Arch Ophthalmology* 1940 Vol. 23 pp. 112-137 [Summary taken from *Internat J Leprosy* Manila, 1940 Oct.-Dec. Vol. 8, No. 4 pp. 535-538 Signed H. E. HASSELTINE]

This paper reports findings of a six months intensive study of eye conditions in patients at the U.S. National Leprosarium. The examination included testing of vision examination of the lids brows conjunctiva lacrimal sac and extraocular muscles external and slit lamp examination of the cornea and iris tonometric measurement visualization of the lens and when possible examination of the fundus with hand and binocular ophthalmoscope. Of the 350 patients examined, 91 per cent. were found to have ocular involvement of some kind. Blindness of both eyes was found in 20 (5.7 per cent.) and of one eye in 29 others (8.2 per cent.) but only 86 (24.5 per cent.) had normal vision in both eyes and 58 others (16.5 per cent.) in one eye. A racial element appeared in the fact that though Mexicans constituted only 25 per cent. of the patients examined 37 per cent. of those with normal vision were of that race white Americans 50 per cent. of the total, contributed only 23 per cent. of the normals. Negroes seemed especially susceptible to ocular complications. The cornea is the ocular tissue most vulnerable to leprosy the most common

change being an infiltration of the deep layer of the stroma. The iris showed all gradations of involvement from a mild degree of swelling with obliteration of the anterior pattern and ectropion uvulae to almost complete fibrosis and atrophy. In the ciliary body there were scattering chronic inflammatory foci around the major arterial circle. In the sclera the lesions were almost always confined to the corneo-scleral junction. Lesions in the retina optic nerve and lens were rare. The mode of infection of the eye was thought to be endogenous. One patient showed an elevation of intraocular tension and 18 had secondary glaucoma. Xanthelasma is quite frequent on the ocular adnexae. Various types of treatment were tried and observed for several months. Quinine bisulphate ointment and thyron locally gave fair results in clearing up corneal infiltration. Dioxin and chaulmoogra oil were not beneficial. Protein shock therapy gave good results in treatment of acute lesions. Postoperative infection in operated cases was not encountered, though the leprosy eye does not tolerate surgery very well. Emphasis is placed on the importance of protection of the eye by various means as a prophylactic measure. Twenty-eight enucleated eyes were sectioned and studied with findings as follows —

Location	Lesions found	Bacilli found
Cornea	22	18
Sclera	None	None
Iris	13	13
Ciliary body	19	14
Choroid	15	9
Retina and optic nerve	None	None

GREENGLASS (J. J.) & SILVERMAN (Irving) *Leprosy a Case Report.*—*Jl Med Soc of New Jersey* 1940 Dec Vol 37 No 12 PP. 583-585 With 3 figs

BLACKBURN (J. H.) *Leprosy with Rapid Progress.*—*Med Jl Australia* 1940 Nov 2 27th Year Vol 2 No 18. P. 440.

TISSEUIL (J.) *Injections intra-arterielles d'huile de chaulmoogra dans le traitement de la lèpre [Intra-Arterial Injection of Chaulmoogra Oil in Treatment of Leprosy].*—*Internat Jl Leprosy Malaria* 1940 Oct-Dec. Vol 8. No 4 PP 465-468.

This brief note records a trial of intra-arterial injections of 2 to 4 cc. of chaulmoogra oil, with 4 per cent guaiacol, into the femoral artery twice a week in two cases of leprosy with perforating ulcers of the feet with a view to obtaining the direct action of the oil on the local condition. The treatment was well borne. The results are reported to be favourable with a considerable degree of healing of the ulcers.

L. R

DAVISON (A. R.) *Leprosy Treatment with Grasset's Tubercle Endotoxin.* *Interim Report.*—*Leprosy Review* 1941 Jan Vol. 12 No. 1 PP. 18-24

On the supposition that there may be a group antigen for the organisms of leprosy and tuberculous, the author tried the effect

of Grasset's tubercle endotoxoid [see *Bulletin of Hygiene* 1939 Vol. 14 p 861] in 11 cases of leprosy. He concludes that the improvement obtained in all the neural cases of tuberculoid type indicated some beneficial result from the treatment.

COLLIER (D. R.) The Use of Diathermy in Leprosy. A Preliminary Report.—*Thai Sci Bull* 1940 Vol. 2, pp 109-116 [Summary taken from *Internat J Leprosy* Manila, 1940 Oct-Dec Vol. 8 No 4 pp 538-539 Initialled H W W]

The writer with Oberdoerffer who at that time was associated with him [at the Chiengmai leprosarium in Thailand (Siam)] on the basis of the latter's theory that the essential predisposing factor in leprosy is adrenocortical insufficiency enhanced by adreno-toxic sapotoxins from food plants employed adrenal stimulation in the treatment of cases. This was effected by means of diathermy one electrode being placed over the upper kidney region and the other over the lower ribs anteriorly. Treatments were given for fifteen minutes twice a week to 33 patients who had been under routine chaulmoogra treatment for at least a year most of whom had made no progress in the preceding half year. At the end of six months there was definite improvement it is stated. Most of the patients were improved generally and had gained weight and none showed any activity of the skin lesions in six cases enlarged ulnar nerves had returned to normal size. At the beginning 18 had positive nasal smears at the end only 2 positive skin smear findings however had decreased only from 23 cases to 20. The most striking results were seen in the marked reduction of frequency of lepra reaction. In the previous six months 21 of these cases had had one or more reactions in the treatment period only 9 had such disturbances and they were of diminished severity. Twelve patients who in the preceding period had had from 5 to 16 reactions each had none at all and only one patient had more than one.

AMERATUNGA (G.) Treatment of Leprosy.—*J Ceylon Branch Brit Med Assoc* 1940 Sept. Vol. 37 No 3 pp 192-201

WEAVER (Eunice) Importance of the Preventorium in the Rehabilitation of the Child of the Leper.—*Internat J Leprosy* Manila 1940 Oct-Dec Vol. 8, No 4 pp 495-500

This paper deals with the history of the separation of young children from their leper parents in order to prevent them contracting the disease and it stresses the importance of this measure. It presents nothing new.

L R

HELMINTHIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

Cestodes—BONNE and LIE HIAN JOE (p 469) describe a case of sparganosis of the intestinal wall in a man in Java. MUELLER (p 469) reports that Charcot Leyden crystals scattered among the cellular elements have been found in the lesions of sparganosis in man and monkey.

BONNE (p 470) gives a short account of the tapeworms which may be found in the East Indies.

BLUTH (p 470) reports a case of epilepsy due to cysticercosis in a soldier and gives details of the symptoms.

BARWELL (p 471) states that in New Zealand about 120 fresh cases of hydatid disease are seen every year in man. Half the sheep and cattle have hydatids and one third of the country dogs harbour the adult worm. The incidence does not appear to be growing less. A review of the world incidence of human disease is given. ROBIN (p 471) describes a case of pulmonary hydatid disease. The patient died of haemorrhage after successfully evacuating the cyst via the bronchi. DÍVEZ (p 471) describes a case of hydatid cysts in the pectoral muscles. One cyst was of the ordinary type the other of the alveolar type. WELCHER *et al* (p 472) describe a case of hydatid disease of the uterus. ARCE (p 472) emphasizes certain points in the surgery of hydatid disease.

BONNE (p 473) records a further case of infection with *Bertiella studeri* in Java.

WOODRUFF (p 473) reports a case of infection with *Dipylidium caninum* in Australia.

Nematodes *Ankylostomiasis*—OTTO *et al* (p 473) consider a zinc sulphate solution of specific gravity 1.180 to be efficient in concentrating protozoal cysts and hookworm eggs but agree with LAKE's view that the straining of faecal suspensions results in loss of eggs.

KELLER *et al* (p 474) show that in six southern United States the incidence of hookworm infection, as shown by the techniques used, fell from 30.8 per cent in 1910-1914 to 11.2 per cent in 1930-1938. The areas of highest incidence are confined to the coastal plain and the places in which the soil is sandy. The age of greatest incidence is 5 to 19 years. The individual worm burden tends to increase as the number of infested persons in the family increases. Infection in whites is four times as frequent as in negroes. In comment LAKE points out that the technique used could not have disclosed all infections. OTAWA (p 474) gives the results of an investigation on hookworm infection in children on the island of Isigaldi. The infection rate was 92.3 per cent in males and 94.2 per cent in females. WINKLER (p 475) reports on the worm infections found in persons of foreign nationality working in German mines. The hookworm infection rate was 1.48 per cent.

BONNE and LEE KIAN JOE (p 475) report 4 cases in which *Ancylostoma duodenale* was found in haemorrhagic patches in the wall of the intestine.

CURT and OTTO (p 476) discuss immunity in hookworm disease concluding that a specific immunity resulting from repeated reinfection is possible though there is no evidence that it becomes absolute. Factors of age, diet and anaemia play a part. The immunity is general, not local, and the constant presence of worms is necessary for maintenance. Severe clinical hookworm disease in man is probably the result of the presence of worms in a host so undernourished or debilitated that the immunity factor is not wholly effective. There may also be exhaustion of the haematopoietic system.

BROWN and OTTO (p 476) have investigated the possibility of children being predisposed to malaria through hookworm infection, since the latter leads to reticulocytosis and it is known that *Plasmodium*

max is far more frequently found in reticulocytes than in mature red cells. They found no evidence in favour of direct predisposition in this way but consider that indirectly by debilitation, both infections even if they do not produce marked anaemia may predispose to other diseases.

AGUIAR (p 477) reports a case of hookworm disease complicated by casts and blood cells in the urine which also contained refractile fatty bodies. The condition improved on treatment with oil of chenopodium.

PAYNE and PAYNE (p 477) have found by comparative tests that the best results in the treatment of hookworm anaemia are given by anthelmintic treatment supplemented by a small amount of iron. Anthelmintic treatment alone produced a much slower rise in haemoglobin and the administration of iron alone was only temporarily effective in that respect. The haemoglobin values fell again if the worms were not removed.

BOVNE (C) & LIE KIAN JOE Darmwandhelminthiasis teweeg gebracht door spargana. [Sparganosis of the Intestinal Wall].—*Geneesk Tijdschr v Nederl Indië* 1940 Nov 26 Vol. 80 No 48 pp 2788-2792. English summary

Two spargana each about 2 centimeters long were discovered in nodules in the wall of the jejunum at the autopsy of an insane Javanese man who died from tuberculosis.

They were fed to a young kitten which began to show Dipyllobothrium eggs in its stools 27 days after the infection. It was killed after 42 days. Two specimens of Dipyllobothrium subgenus Spirometra were found in the intestine. Length 110 and 84 centimeters respectively.

A previous case of human sparganosis in the Netherland East Indies was described in 1930 also in an insane individual. A very big sparganum (length many decimeters) was discovered in the pulmonary artery of this patient. [See this *Bulletin* 1931 Vol. 28 p 678]

MUELLER (Justus F) The Occurrence of Charcot-Leyden Crystals in the Lesions of Sparganosis. [Paper read at 16th Ann Meeting of American Society of Parasitologists. Abstract taken from *Supp to Jl Parasitology* 1940 Dec. Vol. 26 No 6 p 23]

Charcot Leyden crystals have been reported by various authors as present in the stools in about 20 per cent of infections with *Endamoeba histolytica* less commonly in certain types of intestinal helminthiasis in the sputum in cases of paragonimiasis and bronchial asthma and in the bone marrow in chronic leukemia. Typical whetstone-shaped crystals resembling Charcot Leyden crystals have now been found in the lesions of sparganosis in man and monkey being most commonly found scattered among the cellular elements particularly the macrophages forming the inner lining of the cysts and galleries or at times free in the space surrounding the worms. These crystals vary in length from 20 to 90 microns and occur most abundantly after the infection has reached a chronic state and the worms have become well walled-off. The crystals have not been found in the tissues of infected mice nor in fishes infected with the encapsulated

plerocercoids of a species of *Diphylobotrium* maturing in gulls. Charcot Leyden crystals are commonly described as octahedral in form but the present crystals, although unquestionably of the same nature as those found in amoebic dysentery etc. are more correctly designated as hexagonal pyramids of the first order.

BORVE (C) De Lintwormen van den mensch in Indië. [The Tapeworms of Man in the East Indies.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940, Oct 1 Vol 80, No 40 pp 2376-2384 With 12 figs.

There are seven tapeworms which have been found in the Indies or which it may be expected will be found. These are *Taenia saginata*, *Taenia solium*, *Diphylidium caninum*, *Hymenolepis diminuta* and *H. nana*, *Raillietina madagascarensis* and *Bertiella studeri*. The author is anxious to receive any examples of these or other possible tapeworms and he gives a short description of them. *Taenia saginata* is the beef tapeworm with intermediate host the ox in which animal is found the cysticercus stage. *Taenia solium* has its cysticercus stage in the pig but human cysticercosis can take place by transmission of eggs from man to man. Thus apparently is the only tapeworm dangerous to life and not only because of the possibility of case to case infection and development of cysticercus but because of the tendency of the cysticercus stage to occur in the brain. *Diphylidium caninum* infects dogs, cats and beasts of prey and its eggs are taken up by fly larvae which as flies may be swallowed by dogs or cats. Infection in man is due to very intimate contact with these animals and occurs especially in children. *Hymenolepis diminuta* is a universal parasite of the rat and the mouse and all sorts of insects—beetles, cockroaches, etc.—act as intermediate hosts. The allied species *H. nana* is a much smaller worm. *Raillietina madagascarensis* has been found in Chinese children but the intermediate host is not known. *Bertiella studeri* is a monkey tapeworm and mites serve as intermediate host. It also has been found in a Chinese child.

W F Harvey

BLYM (William) Cysticercosis Epilepsy.—*Brit. Med. J.* 1941 Mar 15 pp 401-402

The man concerned served in the Army in India from 1927 to 1933 and then passed into the Reserve. He had thereafter an attack of nightmare, his room mate telling him that he had been throwing his arms and legs about, after another he was found lying on the floor after a third he had mental confusion without loss of consciousness. Recalled to the Army he was sent to France and on one occasion felt a choking sensation while bending over his haversack, and lost consciousness, but, so his companions told him neither twitched nor went pale. In September 1940 on guard duty he felt choking coming on, left his post to sit down and woke to find himself in the guard room having he was informed threatened his officer. His plea of loss of memory sent him to hospital where he showed no symptoms. His history suggested epilepsy, but a paterson test being negative cysticercus infection was considered and X-rays showed widespread evidence of this, the opacities being of uniform density.

Clayton Lane

BARNETT (Louis) The Incidence of Hydatid Disease in New Zealand and Elsewhere.—*New Zealand Med J* 1940 Dec. Vol 39 No 214 pp 330-338. With 1 map [26 refs.]

An annual survey of hydatid disease in New Zealand about 120 persons with fresh infections come for treatment every year and about 16 of them die. Half the sheep and cattle have hydatids and a third or more of country dogs harbour the adult and in spite of an intensive campaign there is no evidence that it is lessening. The disproportionately heavy infection in South Island comes from the heavy incidence in the Canterbury District. The numbers of cases reported in various countries are in Uruguay over 400 Argentina over 300 Australia over 200 New Zealand over 100 There are over 50 in each of these areas Syria and the Near East Greece Yugoslavia (Dalmatia) Italy (Sardinia) Germany (Mecklenburg Pomerania) Russia (Crimea, Caucasus Siberia) Spain Portugal Switzerland North Africa (Algeria Tunis) South Africa Balkan States over 30 in each of Iceland, Holland (Friesland) France Cyprus Great Britain over 10 in Scandinavia and the Baltic States India, China U.S.A. Canada A stippled map makes this clear. The alveolar form is almost limited to Bavaria Tyrol Wurtemberg Switzerland, Moscow Kasan, Irkutsk and Tomsk. C L

ROBB (Douglas) Hydatid Cyst of the Lung with Extraordinary Complications.—*Australia & New Zealand J Surg* 1940 Oct Vol 10 No 2. pp 181-194 With 3 figs.

The patient died of haemorrhage from the residual cavity of a hydatid cyst of the lung after successfully evacuating the whole of its fluid and membrane via the bronchi. There was communication between the cavity in the lung and the stomach. C IV

DREOST (A. O.) Two Interesting Cases Hydatid Cyst of the Lung treated by Lobectomy.—*South African Med J* 1941 Feb 22. Vol 15 No 4 p. 71

DÉVÉ (F) Échinococcose hydatique et échinococcose alvéolaire Coexistence des deux lésions dans le système musculaire observée chez un normand [Hydatid Disease and Echinococcus alveolaris Coexisting in the Muscles of the Same Person.]—*Bol Inst Clin Quirrig* Buenos Aires 1940 June-July Vol. 16 No 134 pp 221-242. With 10 figs [22 refs.]

A man of Normandy, aged 48 had a hydatid cyst in each pectorals major an ordinary one in the right an alveolar one in the left. Except for being sent to Salonika during the last war he had never left home. He had not associated with butchers pork butchers shepherds or dogs and there had been no housedog since he was a child. His curious history was that while carrying on his right shoulder a weight of 80 kgm. and without any blow or sharp movement a sudden painful swelling appeared above the right nipple. With it there was no urticaria and no local ecchymosis but a weakness in the right arm. In ten days this had passed off the swelling had greatly lessened and it was supposed that he had ruptured muscle fibres. Later the finger like horizontal residual swelling grew to the size of a lemon. The diagnosis was lipoma but operation revealed a

sterile hydatid cyst in the substance of the right pectoral stretching out towards its attachment to the humerus but not affecting the bone. Its removal needed considerable dissection, but revealed the wall as the adventitia of a hydatid cyst enclosing many daughter cysts, some living, some collapsed but no mother cyst membrane. When the stitches were taken out the other cyst was found at the attachment of the left pectorals major to the sternum. After being dissected out serial sections showed it to be an alveolar hydatid measuring 1.9 cm. in its longest diameter with round giant cells and a cellular palisade set in fibrous tissue. The excellent illustrations are ample evidence for the conclusions C L.

McNALLY (Andrew) & CASE (James B) Echinococcus Cyst of Muscle
Report of a Case occurring in the Left Psoas Muscle.—*Am J Surg* 1941 Feb Vol 51 No 2 pp 419-422 With 2 figs

WELCKER (Merrill L.) KANE (George D.) & GOODALE (Raymond H.)
Primary Echinococcal Cyst of the Uterus.—*Eng J Med* 1940 Oct 10 Vol 223 No 15 pp 574-578 With 3 figs.

This is held to be the 43rd reported case of primary hydatid disease of the uterus and the first from North America.
A woman of 77 came to hospital for retention of urine and lower abdominal pain of 3 days standing. She died before her condition allowed of operation and the autopsy result is reported. The uterus 14 cm across, filled the pelvis in its posterolateral wall lay a hydatid 13 cm across and consisting of mother cyst about 100 daughter cysts and free scoleces. No other hydatids were found in any other organ. The ureters and the pelves of both kidneys contained pus C L.

ARCE (Jose) Hydatid Disease (Hydatidosis) Pathology and Treatment.—*Arch Surg* 1941 Jan Vol 42 No 1 pp 1-17 With 3 figs

"The aim of the paper is to offer physicians in the United States a brief summary of the actual knowledge of this disease, its pathologic features, its diagnosis and its treatment."

This knowledge it has been the business of this Bulletin to give. Arce's surgical experience brings out these points—there must be complete protection of the operating field by towels to prevent hydatid seeding of the abdomen, complete evacuation of the parasite destruction of any scoleces that remain by running in ether or 2 per cent. formal (that is 2 per cent of 40 per cent formaldehyde solution) and closure of the adventitial cyst and of the skin without drainage (Pocadas's method). Alternatively there may be removal of the cyst and its adventitia complete if the cyst is small and particularly if it is in the omentum or peritoneum. Lastly there is what he calls "hydatid birth" by which is meant exposure of the adventitia, its incision without injury to the parasite which delivers itself whole the pouch being sutured and the operative wound closed without drainage. He puts the percentage distribution of cysts as—liver 70 lungs 15 muscles 4 spleen 3 bone connective tissue brain and kidney each 2. C L.

- BOYVE (C.) Over *Bertiella studeri* (Blanchard 1891) *Bertiella salyers* Stiles & Hasall 1926 *Bertiella salyers* Blanchard 1891—*Genesck Tijdschr v Nederl-Indië* 1940 Sept 17 Vol. 80 No 38 pp 2222-2230 With 7 figs on 1 plate [17 refs] English summary

Previously observed cases of *Bertiella studeri* infection in men are shortly described. A new case in a 7 year old Chinese girl in Java is added. The internal anatomy of the worm passed by this girl is compared with the internal structures of *Bertiella* in Java monkeys (*Macacus cynomolgus*). No important structural differences were observed. The head of the worm causing the human infection was not available. Special suggestions regarding the modus of infection do not arise from this case. The plate gives illustrations of anatomical details of the worms in men and in monkeys.

- WOODRUFF (Harold A.) Uncommon Tapeworm in a Child (*Dipylidium caninum*) [Correspondence]—*Med J Australia* 1940 Dec 21 27th Year Vol 2 No 25 p 682

A report from the University of Melbourne. A child of 17 months passed a segment in a stool. Male fern brought away a complete *D. caninum*. C L

- IWATA (Seishun) The Classification List of Cestoides in Japan.—Reprinted from *Volumen Jubilar Pro Prof Sadao Yoshida* Osaka Japan 1939 Mar Vol 2, in *Collected Papers from the Faculty of Medicine Osaka Imperial University* 1939 pp 29-51 [76 refs]

- OTTO (G F) HEWITT (Redginal) & STRAHAN (Dorothy E) A Simplified Zinc Sulfate Levitation Method of Fecal Examination for Protozoan Cysts and Hookworm Eggs—*Amer J Hyg* 1941 Jan. Vol 33 No 1 Sect. D pp 32-37

The above results confirm earlier reports (Faust *et al* 1939 and 1939) that zinc sulfate solution at a specific gravity of 1.18 is very effective in concentrating protozoan cysts and is essentially as good as saturated sodium chloride solution (sp grav. 1.2) in concentrating hookworm eggs. However these results clearly suggest that straining fecal material through cheesecloth as described by Faust and his co-workers has no great merit and actually reduces the efficiency of the zinc sulfate levitation method. This is in accord with Lane's (1940) objection to screening.

In an attempt to simplify the procedure we utilized zinc sulfate solution in a simple levitation technic essentially as described by Willis (1921) without straining, washing, or centrifugation. This simplified technic appears to be just as efficient as the original zinc sulfate levitation method for concentrating hookworm eggs and nearly as efficient as the latter method in concentrating protozoan cysts. It seems altogether probable that the greatest efficiency with this solution would be obtained by using it in an apparatus similar to that described by Lane (1924) in which a coverglass is held against the mouth of a tube while it is being centrifuged. Since we were searching for a technic which would not require any appreciable amount of apparatus this suggestion was not experimentally tested.

KELLER (Alvin E.) LEATHERS (W. S.) & DENSEN (Paul M.). The Results of Recent Studies of Hookworm in Eight Southern States.—*Am. J. Tr. & M. D.* 1940 July Vol 20 No 4 pp 493-500 With 2 figs. [16 ref.]

These surveys were by the small drop dilution method of Stoll and Hansheer the earlier ones with which they are compared were by faecal smears.

1. Hookworm surveys in eight southern states were made during the periods 1910-1914 and 1936-1938. In the early period, 577 591 specimens of feces were examined and in the later period, 424 511. The numbers found positive in the early and later periods were 240 693 and 81 813 respectively.

2. After adjustment for the distribution of the population the percentages found positive in six of the eight states was 34.6 per cent in the earlier period and 11.2 per cent in the later period, resulting in a reduction of 68.3 per cent.

3. In the later study the states in the order of prevalence from highest to lowest were as follows: Mississippi, South Carolina, Alabama, North Carolina, Kentucky and Tennessee.

4. While there is a wide-spread distribution of hookworm, the areas of highest incidence are confined to the coastal plain and sandy soil areas of each state.

5. The age distribution shows that the greater prevalence was in the group 5 to 14 years of age. The peak of incidence 24.5 per cent was reached in the age period 15 to 19. In preschool children and adult the incidence was about one-half as great as that found in the school age group.

6. The distribution of all positive cases shows that about one-fourth of the individual had moderate heavy or very heavy worm infestation sufficiently severe to produce clinical symptoms. The remainder of the cases were classified as very light or light infestations.

The data analyzed with reference to household groups seemed to indicate that the individual worm burden tended to increase as the number of infested persons in the family increased.

7. A comparison was made of hookworm in 174 533 negroes and 54 028 white persons in the same counties during 1936-1938. The incidence in negroes was about one-fourth that in white individuals and the average worm infestation was about one-half that found in white persons.

In the method of Stoll and Hansheer (200 grammes of faeces is used. Using D.C.F.F. 1 has never obtained from a faecal specimen consistent count of less than about 30 eggs per gramme presumably then the result of a single female hookworm. I suggest a vector according to 10 to 10 examinations by the Stoll-Hansheer method are needed to display the presence of a female hookworm and even then will do so with certainty only if eggs are evenly distributed in the faecal mass. It does not disclose all present infections. C. L.

OHAMA YAMANO. Observations on the Disease of Hookworm in Iriyaki Island, Okinawa Prefecture. I. On its Incidence and Degree of Infestation among Children of the Kabira Primary School.—*Jour. Iriyaki Zasshi* (Jl) Vol 4 (see *Formosa*) 1940. Oct Vol 39 No 10. In Japanese pp 1357-1367. [25 refs.] English summary p 1367.

The author investigated both the incidence and the degree of hookworm infestation among 91 children (39 males, 52 females) of the

Kabira primary school Isigaki Island Okinawa Prefecture by means of Wakeshima's egg-counting method. The results are summarized as follows —

1 The infection rate of hookworm among children of the Kabira primary school was 93.4 per cent. (92.3 per cent for males and 94.2 per cent for females)

2. The observation of age groups with regard to the incidence of hookworm disease indicated that the infection rate was 100 per cent. in 10, 11 and 16 years of age and 85.7 per cent. in 12 years of age (the lowest of all)

3 The average number of eggs evacuated by a child was 256,345 per day. The number of eggs evacuated according to sex was 170,148 for the males and 320,994 for the females: i.e. the number for female children was roughly twice as many as that for male.

4 The degree of infection of hookworm among the children of Kabira primary school was as follows. Very light cases 42.86 per cent., light cases 38.48 per cent., moderate cases 14.29 per cent., severe cases 0 per cent. and very severe cases 0 per cent.

WINKLER (Annaliese) Ueber die Verbreitung von *Ankylostoma duodenale* bei Grubenarbeitern. [Incidence of *A. duodenale* in Miners.]—*Klin. Woch.* 1940 Mar 16, Vol 19 No 11 pp 252-254. [11 refs.]

There have been examined essentially by Fülleborn's gravity floatation method using a saturated solution of common salt, the stools of 149 Italians and 1,463 persons from south-east Europe working in German mines.

The discovered percentages of infection for the two groups were hookworms 2.68 and 1.3, *Ascaris* 6.71 and 4.58, *Trichuris* 24.16 and 5.19, *Enterobius* 1.34 and 0.48. As controls 550 persons were examined, 310 from hospitals and nursing homes and 240 from elsewhere, the respective percentages of discovered infections being hookworms 0.32 and 0, *Ascaris* 3.87 and 2.92, *Trichuris* 1.29 and 0.42, *Enterobius* 0.97 and 1.25. It is pointed out that the percentage of hookworm infections in German miners in 1903 was 13, in 1912 was 0.18 and now has risen to 1.48 [but the Hamburg method was not published till 1926 (HUNG this *Bulletin* 1927 Vol. 24 p 195)] and on the influence of an egg concentration method in increasing discovered infections Winkler makes no comment]. C L

BONNE (C) & LIE KIAN JOE Over darmwandhelminthiasis.

* [Helminthiasis of the Intestinal Wall.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Nov 26 Vol 80 No 48 pp 2782-2788. [Refs. in footnotes.] English summary.

Description of 4 new cases of helminthiasis of the intestinal wall, a condition previously described by the senior author [this *Bulletin* 1938 Vol. 35 p 277]. In three of these cases a single specimen of *Ancylostoma duodenale* was found on dissection of the hemorrhagic patches in the intestinal wall. In the fourth case 5 specimens of *A. duodenale* were discovered, one of them in a fresh hemorrhage in the wall of the colon, the other four in hemorrhages in the wall of the small intestine.

Ancylostoma duodenale was also present in the intestinal contents; their number was small in comparison with the number of *Necator americanus* present at the same time. For the first time helminthiasis of the intestinal wall was discovered in a Chinaman.

[Knowledge of the condition dates back to GRASSI (1879) WHIPPLE reported it in Panama in 1909. LOOS in 1905 found a fairly adult worm half in a cavity in the intestinal wall and half hanging into the lumen of the gut. The valuable report on these new cases suggests that the condition will be found oftener if looked for.] C. L.

CORR (W. W.) & OTTO (G. F.) Immunity in Hookworm Disease.—*Rev. of Gastroenterology* 1940. Jan.-Feb. Vol. 7 No. 1 pp. 2-11 [19 refs.] Discussion pp. 11-14

A discussion on work, by the authors and others, bearing on this matter and already abstracted in this *Bulletin* [1932, Vol. 29 p. 782; 1933, Vol. 30 pp. 219-221; 1935, Vol. 32, p. 641; 1939 Vol. 36 p. 833].

It is difficult to explain many results of experimental infections of dogs with *Angiostrongylus canis* otherwise than by development of specific immunity resulting from repeated infections, but though this immunity may be highly protective there is no evidence that it becomes absolute and it is subject at least to the complicating factors of age, diet and anaemia. Age resistance is believed to be in the ability of mature dogs to acquire a specific immunity more quickly than young animals can. In dogs seriously debilitated by defective diet or anaemia the mechanism that produces and maintains specific immunity cannot respond effectively to invading worms. This immunity is general, and not local, is caused by specific antibodies and the continuous presence of worms in intestine or tissues is needed to keep it up.

In man, too, there is evidence that host reactions are important in regulating hookworm infections.

"We suggest, therefore, the hypothesis that severe clinical hookworm disease as it occurs in human populations is rarely an uncomplicated effect of the presence of hookworms, but is commonly due to the presence of hookworms in hosts so undernourished or otherwise debilitated that the immunity factor is not wholly effective. There may also be in certain cases an exhaustion of the hematopoietic system or the development of idiopathic anemias under a complicated set of conditions in which the presence of hookworms is only one factor."

C. L.

BROWN (H. W.) & OTTO (G. F.) Hemoglobin and Reticulocyte Studies on Hookworm and Malaria Infected Children.—*Amer. J. Hyg.* 1941 Jan. Vol. 33. No. 1 Sect. D pp. 22-31 [38 refs.]

The studies were made on 673 white school-children in North Carolina and the authors had in mind the finding by HEGNER [this *Bulletin* 1939 Vol. 38 p. 495] that *Plasmodium vivax* was found in reticulocytes 1,292 times more often than in mature red cells, thus raising the question whether hookworm infection predisposes to malaria seeing that when acute in dogs it has raised the reticulocyte percentage as high as 40.

First it was necessary to know whether hookworm infection was present. For this purpose D.C.F. using a saturated solution of common salt was compared with the egg-counting technique of STOLL. In 573 faecal specimens large enough for both techniques to be used D.C.F. disclosed infections in 32 per cent., Stoll's technique in 17 and in no case positive to the latter did the former fail to display eggs. (Moreover Stoll's method displayed no infection other than that of

hookworms while D C F disclosed *Enterobius* five times *H. nana* twice *H. diminuta* once *Taenia* once free living nematodes five times.) It may be assumed, it was added that Stoll's method missed about half of these light hookworm infections and since it was used in all recent surveys the figures reported from these surveys are correspondingly incorrect. But though the average intensity of infection was light here there were local pockets where it was heavy in family and community. In all groups of children the haemoglobin level lay between 12 gm in 100 cc of blood among those who had both hookworm and malaria and 12.7 among those who had neither but there was an average difference of 0.1 gm between the latter and 71 who had hookworm infection only. Further the reticulocyte percentage was 0.8 in 444 in whom neither infection was present and was 1.2 in eight who had both.

It seems to us that many of these school children are perhaps on the threshold of anemia. While there is no evidence of a predisposition to malaria as a result of hookworm reticulocytosis the infection cannot be regarded as wholly benign. Hookworms may well be even in light infections a contributing factor in the illness of such patients while not present in sufficient numbers to be alone the cause of anemia. Hookworms or malaria or both by partial debilitation may predispose to other infections even though neither is sufficient to produce a marked anemia. Thus any one of the contributing factors in this threshold condition may with little change appear to be the cause of subsequent illness.

[It seems to have escaped attention that where a specimen is large enough to allow of D C F but not of Stoll's method as well the mere adding of more salt solution and spinning three more times using that is D C F F gives ready and accurate counts.] C L

AGUIAR (José Adonias) Nephrose lipoidica ankylostomosa
[Lipoid Nephrosis from Hookworms.]—*Brasil-Médico* 1940
Mar 2. Vol 54 No 9 pp 129-135

A youth of Bahia Brazil aged 20 had in the urine refractile fatty bodies hyaline and granular casts and some red and white corpuscles the fluid having a faecal smell the blood on one occasion was positive for malaria parasites [haematozoario de Laveran] in the faeces were eggs of *Ascaris*, *Trichuris* and *Ankylostoma duodenale* the last in large numbers there were signs of ascites and pleural effusion and puffiness of face penis and scrotum. He improved with oil of chenopodium, the hookworm eggs becoming few but no search of the faeces had apparently been made to determine the hookworm species actually concerned. There is no further mention of the other intestinal worms or of the possibility that this generous host of parasitic species, among them the Old World hookworm may not also have been exhibiting the chyluria caused by *B. bancrofti*. C L

PAYNE (George C) & PAYNE (Florence King) Relative Effectiveness of Iron and Anthelmintics in the Treatment of Hookworm Anemia.
—*Amer J Hyg* 1940 Nov Vol 32 No 3 Sect D
pp 125-132

This sustained controlled work should, though it is probably optimistic to hope that it will be accepted as showing that effective treatment of hookworm anaemia must have two parts—unworming and replacement of lost iron.

The study was made on children who showed more than 4,600 hookworm eggs to the cc. and were anaemic as measured in the laboratory by the photoelectrometer of Sandford and Sheard. It was first shown that the value of the last method was not lessened by the delay in examination involved in sending the specimen to the laboratory. If malaria, syphilis, schistosomiasis or tuberculosis were suspected, the data were not used. Ordinarily anthelmintic treatment was by a mixture, in capsules, of carbon tetrachloride and oil of chenopodium in the proportion of two to one. If these could not be swallowed or if there were heavy *Ascari* infection the treatment was limited to the oil. A purgative followed. Treatment did not aim at complete unworming, but at least a lessening which could be brought about without disorganizing school work. For giving iron Bland's pill was found more suitable than ferric ammonium citrate. The authors' conclusions are as follows:

" 1 The work of Rhoads and his associates (1934) on the treatment of the anemia associated with hookworm infestation was supplemented by additional studies under field conditions and extending over a longer period.

2 Tests of the effect of treatment with iron alone, with anthelmintic alone and with iron and anthelmintic were made separately on groups of anemic and hookworm infested rural school children in Puerto Rico.

3 Administration of iron was followed by a rapid and striking increase in hemoglobin. If the parasites were not removed there was a definite fall in the hemoglobin level within 6 months.

4 Following anthelmintic treatment there was a slow rise in hemoglobin values and a satisfactory level was reached in from 1 year to 2 years.

" 5 Anthelmintic treatment supplemented by a small amount of iron gave the most satisfactory results in the maintenance of the hemoglobin level.

C. L.

RELAPSING FEVER, RAT-BITE FEVER, LEPTOSPIROSIS

PRELIS OF ABSTRACTS IN THIS SECTION

MORRISON and PARSONS (p. 478) report that relapsing fever is not uncommon in California and Nevada, and that the infection is frequently contracted at Lake Tahoe. They record three cases in one family, one in a child aged six days, but cannot account for the outbreak, since neither rodents nor *Ornithodoros* were found in the house. HEMINGWAY *et al.* (p. 479) record relapsing fever from central Oregon.

ROW *et al.* (p. 479) recovered *S. münz* by inoculation of deposit from centrifuged human blood into a mouse.

SNAPPER *et al.* (p. 480) report leptospirosis in two persons engaged in work which necessitated the handling of dogs' urine in Peiping. Five of 52 dogs examined showed agglutinins, and the same was true of several *Rattus norvegicus* trapped in the city.

DEMONTE and GUPTA (p. 480) used bacteriophage to purify a culture of *L. icterohæmorrhagiae* contaminated with *S. typhi* *maritimus*.

KWEE TAT TJHONG (p 481) has studied the distribution of leptospirae in the kidneys of infected animals acting as chronic carriers

C H

MORRISON (Sydney K.) & PARSONS (Lawrence) *Relapsing Fever Report of Three Cases, One in a Six Day Old Infant*—*Jl Amer Med Assoc* 1941 Jan. 18 Vol 116 No 3 pp 220-221

A report of three cases of relapsing fever one in a six-day-old infant occurring in the members of a family living in Reno Nevada. The authors mention that since 1933 each year they have seen about half a dozen patients with relapsing fever nearly all having acquired the infection at Lake Tahoe. Two medical practitioners in Sacramento California are stated each to have seen as many cases also originating mostly at Tahoe so that the disease would seem to be not rare in California and Nevada.

The above 3 cases however occurred in a family that had not visited Tahoe during the year and the source of infection was not ascertained. No rodents nor *Ornithodoros* were found in the house where the cases occurred although other species of ticks were present. The newborn infant which showed large numbers of spirochaetes in its blood six days after birth may have been infected *in utero* through the placenta or the spirochaetes may have entered during its transit in the birth canal. All three cases were cured by injections of neocarsphenamine.

It is recommended that in this region relapsing fever should be suspected in persons taken suddenly ill for no obvious cause and suffering from chills fever headache and with a normal leucocyte count. Mild leucocytosis is said to be uncommon.

E Hindle

HEMINGWAY (Max W.) & HEMINGWAY (Robert W.) & ARNESON (Valborg K.) *Relapsing Fever*—*Northwest Med* 1940 Oct Vol. 39 No 10 pp 362-364 With 3 figs

The description of a case of relapsing fever in central Oregon. The symptoms were typical and spirochaetes were found in the blood after the third febrile attack. The patient was treated successfully by intravenous injections of 0.1 gm novarsphenamine on two successive days.

There was no indication of the source of infection

E H

ROW (R.) AMBEGAONKER (S. D.) & BHENDE (Y. M.) *Recovery of *Spirillum minus* from the Peripheral Blood of a Rat-Bite Fever Case by Experimental Inoculation into a Clean Mouse*—*Indian Med Gaz* 1941 Jan. Vol 76 No 1 pp 39-40

A record of the recovery of *Spirillum minus* from the peripheral blood of a typical case of rat bite fever in Bombay. Although the organisms were not found by direct examination of the patient a mouse inoculated intraperitoneally with the centrifuged deposit from 1 cc of his blood showed a heavy infection with *S. minus* 12 days later.

E H

LOOS (D.) Unfall und Ikterus infect. Well. [An Accident and Infection with Weil's Disease. — *Verh. W'ch* 1940. Feb 24 Vol 14 No 8 p 195]

The record of a typical case of Weil's disease in a Breslau butcher which developed 7 days after the patient had received a cut in the slaughterhouse E H

SWARTER (Isidore) CHUNG (Huei-Lan) CHU (Irving) & CHEN (Hoo-Ching) Preliminary Observations on Human, Canine and Murine Leptospirosis in North China. — *Chinese Med J* 1940 Oct Vol 58 No 4 pp 408-426 [12 refs]

An account of preliminary observations on the prevalence of leptospirosis in China, which hitherto has only been reported from Canton by T'ANG [See this *Bulletin* 1937 Vol 34 p 707]

The authors give details of two cases of *L. canicola* infection. Both patients were members of the department of physiology at the Peiping Union Medical College and for some months had been engaged in work necessitating the handling of dogs' urine. Although leptospirae were not found, the blood of both cases agglutinated the Roesel strain of *L. canicola* and the Sumatra strain of *L. hebdomadis* B in high dilution, but not other strains. The agglutination of *L. hebdomadis* is probably a para-specific reaction often occurring with this strain. Also the sera of three of the dogs, to whose urine the patients had been exposed, agglutinated *L. canicola* but not other strains.

Five out of 52 dogs examined in Peiping showed evidence of infection, the agglutination titres being respectively 1:10,000 in the 2 human and 2 canine cases, and 1:100, 1:1,000 and 1:3,000 in the other canine cases. The sera of 5 out of 68 rats *R. norvegicus* trapped in Peiping, contained antileptospira agglutinins with a titre of 1:100 or higher. The agglutinins present belonged to three types of leptospira, *canicola* (Roesel), *hebdomadis* 4 and *bataviae* (Swart). All attempts to find leptospira in 172 rats were negative. *Trypanosoma lewisi* was found in 78 out of 173 rats. *Cisticercus fasciolaris* in 85 out of 181 and in 3 rats the urine and scrapings from bladder contained spirochaetes morphologically resembling *S. recurrentis*. E H

DEMONTE (A. J. H.) & GUPTA (S. K.) The Use of Bacteriophage for freeing Protozoal Cultures of Contaminating Bacteria. (Isolation of *Leptospira icterohaemorrhagiae* from a Mixed Infection in Guinea Pigs). — *Indian Vet Gaz* 1941 Mar Vol 78 No. 3 pp 154-155

The description of a method of purifying a strain of *Spirochaeta icterohaemorrhagiae* which had become contaminated with a *Salmonella* group of organisms.

The mixed culture was exposed to the action of a potent bacteriophage active against *S. typhi* var. *newburn* (*Bact. aertrycke*) which produced complete lysis in 4 hours. The mixture was kept at room temperature for 5 hours and then inoculated into guinea-pigs, from which the pure strain of leptospira was recovered.

This action could not be obtained in the presence of gross organic tissue such as that produced by grinding up infected liver and kidney.

tissue but the removal of gross matter by filtration through kieselguhr paper or by centrifuging resulted in the purification of the strain. [The title of this article is somewhat misleading as no protozoal cultures are referred to but only a strain of *Leptospira icterohaemorrhagiae*.] E H

KWEE TAT TJHONG Over de positie der leptospiren in de nier bij chronische uitscheiders [The Position of *Leptospirae* in the Kidneys of Chronic Carriers.] [Thesis for Doctorate of Medicine Medical School Batavia]—80 pp With 6 figs on 1 plate [133 reis] English summary

In animal carriers the leptospirae are continuously excreted with the urine. They maintain themselves by multiplication in certain parts of the renal cortex. They are not equally distributed throughout the kidneys but they inhabit closely packed together in clusters the lumen of contiguous convoluted tubules. These groups of infected tubules may be more or less numerous and are usually picked up with ease under the low power of the microscope.

Serial sections reveal that these infected tubules are parts of the same nephron. Two or more neighbouring nephrons may be infected. This condition was studied by the author in *Rattus norvegicus*, *Rattus rattus brevicaudatus*, cats, dogs and pigs infected in nature and in experimentally infected guinea-pigs and white mice which had been made carriers by the use of less virulent strains of leptospirae. In all these animals the leptospiral clusters are found in the distal convoluted tubules only.

During the acute period of infection the leptospirae pass from the interstitial renal tissues through the wall of the tubules into their lumen. In the proximal convolutions and in Henle's loop the strength of the current of the urinary fluid washes them down towards the distal part of the nephron. In the meantime most of the fluid in the tubules is absorbed and only a relatively weak flow continues in the distal convoluted tubules. The irregular outline of these tubules with their niches and tortuosities offers a chance for the leptospirae to settle amongst the debris often present there and to establish a more or less permanent colony.

If human chronic leptospiral carriers occur we may also expect the leptospirae to live in the distal convoluted tubules which have irregularities in shape comparable to those in the animals studied.

MISCELLANEOUS

ELLIS (A G) Notes on Disease in the Far East.—*Rocky Mountain Med J* 1941 Apr Vol 33, No 4 pp 289-292.

In this paper the author draws upon his experiences as pathologist in a hospital in Bangkok over a period of 17 years. He refers briefly to the prevalent diseases. The enteric fevers are common. Malaria is very prevalent especially in northern Siam in one series of

Epidemic dropsy is included in the chapter on disorders of nutritional importance and though mustard oil is stated to have been suspected as the cause of an epidemic in 1872 in Fiji the recent very convincing work carried out in India which incriminates the products of *Argemone mexicana* seed contaminating mustard oil, is not referred to.

The snakes and spiders of Australia and the lesions they produce are described in some detail, and the poisonous fish and plants of the region receive notice.

Although in this review certain omissions have been referred to these have so largely been omissions of very recent work that it may be assumed that the reports were not available to the author before going to press, and it is in no spirit of criticism that these have been pointed out. Work in several branches of tropical medicine has proceeded apace in recent years and it is with a view to future editions that the remarks in this review have been made. The book is an admirable and concise summary of standard work on the subjects with which it deals and can be recommended with the utmost confidence to students and practitioners in Australasia, for whom it is specifically intended. It is well printed and bound. It would perhaps be improved by the inclusion of more illustrations—diagrams of the worms and protozoa described, and photographs of the more obvious lesions in the diseases mentioned, but this might entail the use of art paper throughout and increase the cost to more than is thought advisable.

C. W.

TROPICAL DISEASES
BULLETIN

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1941

[No 9]

SUMMARY OF RECENT ABSTRACTS *

VII HELMINTHIASIS

[continued from p 430]

Cestodes

BARNETT (p 211) discusses errors in teaching and in practice with regard to hydatid disease the remarks cannot be further abstracted but he points out that the slowness of growth and generally good behaviour of most cysts is not sufficiently recognized. He (p 586) discusses hydatid disease in man sheep and cattle in New Zealand. More than half of the beasts in the country are infected by the time they reach adult life. In public and private hospitals during 1938 there were treated 144 human cases.

In Iraq SEVERJI and BEATTIE (p 587) report an incidence of hydatid disease in 0.313 per cent of hospital patients of 11-93 in sheep and goats and of 24.66 in cattle. Adult worms were found in 17.83 per cent of street dogs. In Santiago de Chili, NEGHME RODRIGUEZ (p 587) reports an incidence of 21.18 per cent of *E. granulosus* in homeless dogs. *Dipylidium caninum* was found in 56.06 per cent. In the United States the wolf forms a reservoir host of *Echinococcus granulosus* of the wild animals RILEY (p 587) reports that the moose is frequently infected with cysts.

LAWSON (p 212) reports a case in which there was a hydatid cyst of the liver which almost obliterated that organ and which was estimated to have been present for 56 years. On pages 589 and 590 are reports by various authors of hydatid cysts of the pancreas kidney ilio-psoas muscle the epiphyses of the knee joint and of the neck.

IVANISSEVICH (p 587) lays down the general lines of treatment of hydatid cysts of the lungs surgical treatment should be early and complete and to ensure this diagnosis must be made early. Rat should be used on all children and on all patients who consult a doctor in endemic areas and in this way small cysts can be detected and treatment instituted when it will be effective. He discusses the conditions which may be found at operation. ITURRASPE (p 588)

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Disease Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

discusses the radiological appearances and the treatment of hydatid cyst of the lung in which part of the parasitic membrane is retained after expulsion of the contents. CHIFFLET (p. 599) discusses the surgical treatment of multiple hydatid cysts of the peritoneum.

MENON and VELIATH (p. 591) have studied the nature of the tissue reaction around cysticerci in man, which leads to absorption of the parasite and formation of fibrous tissue: the multiple scars thus formed in the brain being held to be the main pathological basis of the nervous symptoms. Calcification of cerebral cysts is not common.

In infection with *Taenia saginata* TOTTERMAN (p. 215) found marked eosinophilia in marrow and blood, but erythropoiesis was not influenced.

MAPLESTONE and MUKERJI (p. 213) report on the treatment of 12 cases of infection with *Hymenolepis nana* with gentian violet in doses of one gram three times a day for varying periods. They conclude that the drug is probably valuable but that much more work is necessary before the optimum method of giving it can be laid down.

VERSIANI and RENAULT (p. 214) report a case of human infection with *Hymenolepis diminuta* in S. America: treatment with oil of chenopodium was apparently successful.

DOLLFUS (p. 214) gives the names of five species of *Railletina* found in man in Ecuador.

TOTTERMAN (p. 215) discusses anaemia and erythropoiesis on the basis of blood and sternal marrow examination in infections with *Diphyllobothrium latum*. In those cases in which the colour index was low there was no improvement after elimination of the worms and in many of these there was bile pigment in the urine suggesting liver damage. If the anaemia was of the pernicious type it improved rapidly on dithionite.

VON BOVSDORFF (p. 215) states that aqueous extracts of *D. latum*, *T. saginata* and *Ascaris lumbricoides* exercise a marked inhibiting influence on the proteolytic activity of normal human gastric juice if the reaction is approximately neutral, but have no such action on trypsin, papain and pepsin, or on gastric juice at strong acid reaction. The worm proteins are quickly digested by trypsin, papain and pepsin, but not by gastric juice at pH 7.4. He (p. 216) shows that in certain experiments a liver preparation which was exposed to the action of *D. latum* and other worms, and to extracts of them, did not lose its anti-anaemic effect.

JOYEUX *et al.* (p. 216) state that ocular sparganosis is becoming more common in the Tonkin delta. All cases are due to the native habit of using frogs, either eviscerated or chopped and in the form of compresses, to the eye. The sparganum may settle in the lid or the orbital fat or may burrow towards the face. The lid is at first inflamed and at this stage removal of the parasite is difficult. Later when encapsulation has taken place removal is relatively easy. The histology resembles that of syphilis and the authors refer to the success of novarsenobillon in treatment.

Nematodes.

Anthelostomiasis Ascaris infection *de*—DESCHIEUX (p. 217) discusses the action of certain fungi, which prey on free-living nematode larvae in relation to the possibility that such fungi may be useful against the nematode parasites of man. To be successful the fungi must be

available in sufficient quantity must grow on the land in sufficient quantity and must be harmless to man, beast and vegetation. The best fungi for this purpose are *Arthrobotrys oligospora*, *Dactyliella bembicoides* and *D. ellipsospora* which grow well on or below the surface; they appear to be harmless to vegetable and animal life but only experience can determine if this is true.

In Colombo WIJERAMA (p. 218) found hookworm eggs in 52 per cent of hospital patients; the infection rate in city dwellers was 23.2 per cent in those from out-stations 69.9 and the average egg counts were heavier in the country dwellers than in the city dwellers. There was a general relationship between the number of eggs passed and the degree of anaemia and there was evidence that ankylostomiasis predisposed to other illnesses. CHIAROTTI (p. 217) reports a focus of hookworm infection at Novara, between Milan and Turin; most of the patients showed clinical evidence of the infection though only a few were anaemic. All houses possess latrines and cesspits but defaecation in the market gardens is common and the people work in these gardens either barefoot or shod only in clogs.

ZAINAL *et al.* (p. 592) have found in hookworm oedema a decrease in total plasma protein and in plasma albumin with an increase in the globulin. The albumin globulin ratio was usually less than 1 which is a reversal of the normal. They consider that the oedema is due to the reduction of the colloid osmotic pressure due to the decrease in albumin and that this lack of albumin may be the result of lack of protein in the diet or of deficient absorption from the bowel.

For the treatment of hookworm infection SMILLIE (p. 219) recommends four drugs in order of election: hexylresorcinol, tetrachlorethylene, carbon tetrachloride and oil of chenopodium. HADDAD (p. 594) gives details of the results obtained from the use of a number of drugs in the treatment of hookworm and other helminthic infections in the Congo.

AZIMY PASHA and ZANATY (p. 218) found that whereas small transfusions of blood in hookworm anaemia had only slight and temporary haematinic value before the administration of iron they produced a further rise of haemoglobin and red cells if they were given after the conclusion of a course of iron therapy. The bone marrow in hookworm anaemia is hyperplastic, erythropoiesis being dominant. The authors consider the aetiology of hookworm anaemia and idiopathic hypochromic anaemia to be essentially due to chronic bleeding and small blood transfusions may therefore be useful after iron therapy in the treatment of the latter condition. OTTO and LANDSBERG (p. 593) show that the addition of iron to a generally deficient diet will not prevent the onset of fatal anaemia in dogs infected with hookworm [nor could it be expected to do so]. In comment LANE quotes from his own writings in which he explains modern views on the extrinsic factor contained in protein food, is necessary iron is needed at a later stage for the transition from erythroblast to erythrocyte.]

MCKENZIE (p. 219) found that the administration of vitamin B₁₂ rapidly cured the oedema in two cases of hookworm anaemia after iron therapy combined with a generous diet had failed to do so. He suggests that the oedema is due to loss of vitamins in the blood extracted from the host by the hookworms. HOFF and SHABY (p. 592) report three cases of subacute combined degeneration of the cord.

caused by severe secondary anaemia due to infestation with *Ancylostoma duodenale* and successfully treated with iron, liver extract and vitamin B₁.

VAN LOOKEREN CAMPAGNE (p. 219) records four fatal cases of poisoning by oil of chenopodium in none had the drug been taken on medical prescription, and he advocates that it should only be obtainable at chemists shops. CAVALLERO (p. 595) gives the results of a study of the pathological conditions induced in the liver of white rats by acute and chronic poisoning with carbon tetrachloride administered by inhalation and of the effect of injection of colchicine on this poisoning. The action of colchicine is to increase mitosis.

HARE (p. 596) reports on the results so far observed of providing bored hole latrines in coolie lines of an estate in Assam. Taking other lines, which have no latrines of this kind as controls, the results of stool surveys show that some improvement in both percentage and weight of infection has been achieved, but it is evident that infection is still taking place probably in the fields and houses. The latrines are a great success and the larvae in the fields and houses will probably gradually die out.

OTTO (p. 593) states that experiments appear to demonstrate that the serum of dogs actively immunized by repeated infection with *A. caninum* contains an antibody of considerable potency against the hookworm larvae. Specific acquired immunity seems to play an active rôle in canine infection and it is necessary to take this into account in the study of human disease.

SANDGROUND (p. 219) describes the intense irritation he experienced after becoming infected with larvae of *Ancylostoma brasiliense* and a species of *Strongyloides*. These persisted for 55 days and in excised skin the larvae were found in the corium 1.5 mm from the surface. In Batavia the slightly moist sand with which European children play is a suitable medium for *A. brasiliense* larvae and cats select such sand for defaecation.

GALLIARD (p. 650) has investigated infection with *Strongyloides* in Tonking. Natural infections of dogs and cats are rarely reported yet these animals are readily infected by larvae from human sources whether this is due to lack of exposure or to lack of investigation is not known. In dogs infected from man, both the direct and indirect cycles of development occur at first, but as passage succeeds passage through dogs only the indirect cycle persists in which a free-living adult stage becomes necessary. These facts point to the identity of the canine and human forms.

BOWNE and LIE KIAN JOE (p. 220) record the finding of *Trichostrongylus* in scrapings of the duodenum of 10 of 40 Javanese the species was probably *T. colubriformis* but a second species was also probably present. HEYDON and BEARUP (p. 220) report a case of infection with *Trichostrongylus colubriformis* in a child in New South Wales.

SCOTT (p. 647) shows that in Egypt infection with *Ascaris lumbricoides* is present in 20 per cent of the rural population, but in the delta it is as high as 80 per cent. In both, however the average number of worms per person is lower than that recorded in any other endemic area. The infection is evenly spread in the villages and is not confined, as is usual in regions of low prevalence to a few families. Infection is transmitted, nevertheless, primarily by direct hand to mouth transfer of eggs which have developed on the moist floors, and thus women and children are more infected than men. MOXMA *et al*

(p 648) report somewhat unfavourably on hexyl resorcinol in the treatment of *Ascaris* infections ill effects were common and the cure rates not high

AUGUSTINE (p 297) found no morphological differences between *Ascaris* recovered from the chimpanzee *Pan troglodytes* and *Ascaris lumbricoides* from man In experiments on *Macaca mulatta* it was found that this monkey was not susceptible to infection with *Ascaris* from man or pig

Filariasis—DASSANAYAKE (p 302) quotes figures of the incidence of filariasis due to *W. malayi* in two areas of Ceylon In both the incidence was at one time high and in both there had been at that time a plentiful growth of *Pistia stratiotes* This plant has in the meantime disappeared and the present rate of infection is very low TOUMANOFF *et al* (p 651) have found *Mf bancrofti* in as many as 11.16 per cent of prisoners in middle Tonking and *Mf malayi* in as many as 6.72 per cent in upper Tonking *A. minimus* and *A. jeyporiensis* have both been found infected with *Mf malayi* and both are strongly anthropophilic in habit in the regions concerned In school-children in the Okinawa prefecture OHAMA (p 300) found an average rate of infection with *Wuchereria bancrofti* of 14.8 per cent. In the majority of cases the infection was light but the degree of infection rises gradually with advancing age. YOKOGAWA and YUMOTO (p 650) found microfilariae in 28.47 per cent of night bloods examined in the island of Isigaki. YOKOGAWA *et al* (p 651) have found that contrary to expectation infection with *W. bancrofti* is present in the Pescadores infection rates in night blood ranged from 0.85 to 11.22 per cent. of children most of the infections were light. *Culex fatigans* is prevalent

KOBAYASHI (p 651) gives details of a study of the morphology of *Mf bancrofti* IYENGAR (p 652) discusses the differentiation of the microfilariae of *W. bancrofti* and *W. malayi* adding a note on the nomenclature of the latter In comment LANE also discusses nomenclature and the more recent description of the adult by RAO and MAPLESTONE [this *Bulletin* 1941 Vol. 38 p 152] places this matter on a proper footing

YOKOGAWA (p 652) has experimented with mature larvae of *W. bancrofti* dissected from mosquitoes and placed on the skin of mice and with larvae set free from the proboscis of the mosquito In the latter case some of the larvae entered the puncture caused by the bite but rarely penetrated if one or two layers of the skin were left intact. After entering the skin through the bite they migrated along lymphatic spaces and also indiscriminately in the tissues. In man the author thinks that larvae may become adult and produce microfilariae 20 to 30 days after infection but LANE asks the pertinent question whether in the author's experiments, the human subjects chosen had ever lived in an endemic area.

BASU and RAO (p 301) have studied the development and transmission of *W. bancrofti* in *Culex fatigans* The physical conditions at which larvae best reach infectivity lie between 70° and 90° F and 70 to 100 per cent. relative humidity The highest infection and infectivity rates are found when the larvae in the blood imbibed number 101 to 150 in 0.2 cc. the lowest rates were recorded when the larvae numbered between 301 and 600 The highest percentages of infectivity were seen when the mosquitoes fed on patients aged between 51 and 60 In a comment it is indicated that the tables on which these conclusions are based need rearrangement.

[September 1941]

PRAWIROHARDJO (p. 304) gives a list of good vectors of *Mf bancrofti* in Batavia, and also of those mosquitoes which are of no importance in this respect. The conclusions were reached on the results of dissections of the mosquitoes after they had bitten the same patient who had *Mf bancrofti* in his blood.

HODGKIN (p. 302) shows that the different species of *Mansonia* have preferences in the water plants to which the larvae attach themselves. *Mf annulifera* prefers the roots of *Pyrisia stratiotes*. *Mf uniformis* prefers *Eichornia crassipes* the water hyacinth but also breeds where swamp grass is found. *Mf longipalpis* larvae are found attached to the roots of certain swamp-loving trees. This mosquito only exceptionally breeds with the species whose breeding places are known and it is the most important vector of *Mf malayi* in Malaya. It follows therefore that the South Indian control measure of clearing *Pyrisia stratiotes* will not be effective in control of filariasis in Malaya. There appears to be no alternative to drainage. BONNE WEBSTER and BRUG (p. 303) observe that *Mf uniformis* uses a considerable number of water plants as hosts. If only *Pyrisia stratiotes* is present the majority of the larvae may be found not in its roots, but in the water or mud at the bottom. BONNE WEBSTER (p. 303) reports that *Mf longipalpis* and *Mf crassipes* have been bred in conjunction with water plants of the genus *Ipomoea*.

GORDON and LUNDEN (p. 633) have made a careful study of the behaviour of the mouth parts of mosquitoes when taking up blood from living tissue. The mosquito was *Aedes aegypti* and the experiments were made on the frog *Rana epimelophala* infected with *Falciparum dichotoma*. The microfilariae of which are present in the circulating blood the process was observed under the microscope as the proboscis entered the web of the foot of the frog. On entering the skin there is an active and purposive bending of the distal fifth of the labrum by means of which the proboscis may pass through a capillary. Feeding may take place direct from a capillary though this entry may be accidental, for the tip may enter a capillary in which case it is a rapid process, or from a pool of blood collecting in the tissues from a ruptured capillary in which case it is relatively slow. It has previously been shown that the numbers of microfilariae taken up by different mosquitoes feeding on the same host at the same time may vary widely and that the numbers found in the stomachs of the mosquitoes after feeding are greater than those found after pool feeding. The explanation of these facts may be that in the capillaries the microfilariae are not evenly distributed, and that microfilariae escape into the tissues less readily than red cells from a ruptured capillary. In comment LANE offers another explanation of the concentration of microfilariae in the stomach of *Aedes* namely that the mosquito after feeding soon passes blood per rectum and microfilariae pass less readily than cells through the gut of the insect, and are therefore relatively concentrated in the stomach.

KNOTT (p. 304) holds that in cases in which microfilariae are found in the night blood they may also be found in the day blood if enough is examined, and gives in detail his method of using the sediment from 1 cc. of venous blood, laked with formalin and stained as a thick film. By this method microfilariae were found in the day blood in 57 of 68 positive cases whereas by using only 20 cmm the microfilariae were seen in 20 only. GALLIARD and NGUYEN HUU PHUEN (p. 305)

point out that the numbers of *Mf malayi* found in the blood at different periods of the day and the total over the whole 24 hours vary widely from day to day.

KVOTT (p 655) describes the pathology of filariasis of the testicle which is a result of lymph stasis due to sterile lymphangitis in the vessels occluded by dead worms and the clinical findings which may be observed. Hydrocele is the disorder which most commonly brings the patient to the physician and the author in giving directions for treatment observes that filariasis of the testicle is always bilateral and that therefore if operation is indicated, both testicles and both inguinal rings should be exposed preferably through a transverse suprapubic incision.

CHOPRA and RAO (p 656) have tested a large number of drugs for their influence on filarial infection (presumably due to *W bancrofti*). Of these Fouadin gave the most satisfactory results causing disappearance of the circulating microfilariae which was however only temporary. It succeeded in controlling the inflammation and fever for a comparatively long time and this result was also obtained with Soamin but this drug failed to bring about any appreciable diminution in the numbers of circulating microfilariae. BROWN and AUSTIN (p 657) show that Stibsol a trivalent antimony compound, is effective in sterilizing the blood of dogs infected with *Dirofilaria immitis*. Several animals which died were found to have dead adult worms in the heart and it seems probable that the effect of the drug is to kill the adults. In the heart of the dog this may lead to clot formation and death of the animal but as LANE points out in comment this risk would not be present in man if the drug were to be tried in infections with *W bancrofti*.

BRUYNOGHE (p 657) discusses Lane's theory that microfilarial periodicity is due to daily birth and daily destruction of larvae. He reports experiments which show that the infection of rabbits with *Dirofilaria immitis* and of guinea-pigs with the embryos of this worm does not produce antibody or sensitize the skin to injection of antigen prepared from the adult worm. In *Loa loa* infections however the *Dirofilaria* antigen was effective in producing reactions. Antigen reactions therefore vary with the host and perhaps with the parasite.

Though filarial infection has not previously been reported from Bolivia MORALES (p 656) reports the finding of the sheathless *Mf demarquaysi* in the day and night blood of five patients there.

HAWKING (p 306) has investigated onchocerciasis in Kenya. In persons from the Kakamega district microfilariae were found in 62 per cent. of a group with eye lesions or nodules and in 38 per cent. of a group of hospital patients taken at random as controls. Eye lesions however occurred in 34 per cent of those who showed microfilariae and in 23 per cent of those who did not so that the association is doubtful. Nodules were present in 16 per cent of those with microfilariae. Eosinophilia is not a useful diagnostic sign. MIRA (p 655) reports the presence of *Simulium daninosum* in parts of Abyssinia adjacent to Kenya [and the unexpected finding of onchocerciasis in Kenya would make it desirable to investigate the possibility of its occurrence here also].

DU BOIS and VITALE (p 306) have found *Mf streptocerca* in the Belgian Congo and state that it is associated with elephantiasis but the fact that the microfilariae are found in the skin in elephantiasis may be a result of the lymph stasis rather than the cause of the condition.

GREIG (p. 638) reports *L. loa* infections of long standing, in which there was no interference with general health. X-ray examinations revealed coiled shadows in the tissues of one arm, which were probably those of calcified *L. loa*.

LINDBERG (p. 659) shows that of the species of Cyclops found in tanks in the Deccan, only *Mesocyclops lewinfer* was infected with *Dracunculus medinensis* and that no more than one embryo was found in any one infected *Mesocyclops*. *M. lewinfer* is by far the commonest species found. He (p. 659) gives a list of fish found in tanks in the Deccan some of which feed on Cyclops.

Enterobius infection. *Trichinaria* etc.—CRAM and HOLAN (p. 300) found 55 per cent of the children in a private nursery day school in Washington to be infected with *Enterobius*. Control measures led to a diminution in the incidence and these consisted of non medicated enemas, the use of lysol for water closets, wash basins and floors, the staining of coats and blankets and careful hand washing after defaecation and before meals.

BRADY and WRIGHT (p. 299) have studied the symptomatology of *Enterobius* infection. They note that after treatment many infested children show gain in weight, improvement in colour, disappearance of dark circles under the eyes and improvement in appetite. Enuresis is not more common than in non-infested children, but vaginitis is more frequent than was previously thought. Restlessness and macomia occur but there is no evidence that the infection causes nervous irritability. There is probably slight eosinophilia.

BOTSFOED *et al.* (p. 648) discuss the association of *Enterobius vermicularis* with appendicitis, noting that 22 patients who had the infection but in whom there was no histological evidence of appendicitis presented a syndrome exactly like that of acute appendicitis. Difference is therefore not possible and the safest measure is appendectomy. On the other hand SCHWARTZ and STRAUS (p. 649) state that *E. vermicularis* regularly causes characteristic lesions of the mucosa of the appendix and may cause abscess. They regard this worm as an important primary cause of appendicitis and consider this as a campaign against it would be of social importance.

WRIGHT and BRADY (p. 649) report favourably on gentian violet in the treatment of threadworm infection quoting the results obtained in 224 cases and measured by tests with the V.H. swab. Details of dosage are given. Previously WRIGHT and his colleagues (p. 649) had reported on santalium hexylresorcinol in enemas or by the mouth and non-medicated enemas. MOKLIN and UHLMANN (p. 300) describe an enema of ether with liquid paraffin and olive oil for the treatment of threadworm infections.

In the *Journal of the American Medical Association* (p. 859) it is stated that in necropsy surveys in the United States about 18 per cent of diaphragms examined have been found to contain larvae of *Trichinella*, but illness was not always caused, so that the incidence of clinical trichinosis is not a true index of the extent of infection. SANITZ (p. 308) found infection with *Trichinella spiralis* in 6 per cent of 400 autopsies in New Orleans. Although the diaphragm contains more embryos than the pectoral muscles, it is estimated that surveys in which the diaphragm only is examined would miss 13 per cent of cases. There were no histories of clinical symptoms of trichinosis in any of the 24 human cases studied. Infection was found in 10 per

cent. of cats in the city and the incidence in cats is regarded as an indication of the endemicity of the infection.

FAIRMIEZGER and SPALDING (p 308) found *Trichinella* larvae in the blood of three children of one family 10 cc were withdrawn mixed with 25 cc. of a 2 per cent. solution of acetic acid and centrifuged the sediment was stained and examined. Eosinophilia was marked during the 12 days following the first examination reaching 30.41 and 51 per cent. respectively. EVERS (p 309) reports the recovery of *Trichinella* larvae from the cerebrospinal fluid of a patient who had symptoms suggesting toxic encephalitis and neuro-retinitis. Larvae from the cerebrospinal fluid have been reported in 24 cases but are not always associated with clinical manifestations careful examination of the fluid may be an aid in diagnosis.

ROTH (p 660) finds that one small infection with *Trichinella* in guineapigs offers some measure of immunity against subsequent reinfection this is apparently due to an intestinal defensive mechanism which restricts the numbers of adults which develop there and shortens their lives.

LICHTERMAN and KLEEMAN (p 660) employed an extract of *Trichinella* larvae for skin tests in pigs which had been fed on uncooked garbage the results compared with post mortem findings, showed an error of less than 3 per cent.

McNAUGHT *et al* (p 309) report that the continuous use of phenothiazine in rats reduced the severity of infection by 74 per cent and warrants further experimentation.

SWARTZWELDER (p 660) gives a description of the symptoms associated with infection with *Trichuris trichiura* in the absence of other intestinal parasites. MAPLESTONE and MUKERJI (p 661) report that the forms of iron in common use for the treatment of certain types of anaemia are of no use in removing *Trichuris*. They therefore cannot confirm the work of VAZQUEZ PAUZA [this *Bulletin* 1938 Vol. 35 p 380]. In their work they found that the Stoll technique was not so efficient as D C F.

SKRJABIN (p 662) from Moscow reports a case of human infection with *Thomox aerophilus* a member of the family Trichocephalidae and normally a parasite of the respiratory system of carnivorous animals. Eggs were present in the patient's sputum and the symptoms were those of severe tracheo-bronchitis.

MAPLESTONE and SUNDAR RAO (p 307) record the removal of a second gnathostome from a man in whom the first specimen had been found 10 years before and in whom the whole history had lasted 17 years. It is not probable that reinfection had taken place, so that the worm had persisted for 17 years and had undergone no change during the last 10 since the two extracted specimens were identical. DAENGSVANG (p 307) reports the finding of an immature female *Gnathostoma spinigerum* in a tumour in the great omentum of a Siamese woman.

Charles Wilcocks

RABIES.

A REVIEW OF RECENT ARTICLES. XLIV.*

1. VIRUS

KLIGLER and BERNKOPF¹ furnish further information regarding the characters of culture virus [see this Bulletin 1939 Vol 38 p 724 and other papers]. A requisite for successful culture is embryo brain (mouse and rat embryo brain are equally suitable). Adult brains are unsuitable. Human or monkey serum seems to be essential for growth. In such suitable media the authors have grown the virus in 250 cc flasks with 25 cc of medium per flask with the same ease as in the case of other viruses. Successful implantation on the developing chick embryo is possible only if 5 to 8 day embryos are employed. When such embryos are inoculated the virus seems to find its way to the brain where it continues to multiply until the embryo is about 2 weeks old. Thereafter the concentration of the virus diminishes and ultimately disappears. The authors have now carried out 20 serial passages in the chick embryo over a period of 7 months. Culture virus rapidly loses its ability to infect mice by the intraperitoneal route though there is no loss of virulence when injected intracerebrally. Embryo brain virus appears to be more virulent than allantoic virus. Both active and formalized culture virus vaccines proved potent antigen. Culture virus appeared to be a much better antigen than chick embryo virus.

A thorough study of the characters of the virus—designated as the Moscow 2 strain by VICHELESSKI and his co-workers and placed by them in the group of neurotropic agents causing encephalomyelitis in horses—has been made by HOWITT². The particle size 80 to 130 millimicron places this virus closer to rabies than to the American strain of equine encephalomyelitis. From the difficulty of ultra-structural and immunological reaction from the absence of ultra-structure from the particle size from the ability to infect dogs both intracerebrally and subcutaneously and from the presence of intracytoplasmic inclusions although slightly atypical and not inclusive for all animals the Moscow 2 virus may now be classified with the rabies strains rather than with the American viruses of equine encephalomyelitis as has formerly been suggested.

II. SYMPTOMS

A case of human rabies is described by PALMER³

- For the thirty-fourth of this series see this Bulletin Vol 32, p 139.
 K. KLIGLER (I J.) & BERNKOPF (Hans). Studies on the Culture and Antigenic Characters of Rabies Virus—*Am J Hyg* 1941 Jan Vol 33, Sect B pp 1-8.
 * HOWITT (Beatrice). Relationship of Moscow Virus of Equine Encephalomyelitis to Rabies—*Proc Soc Exp Biol & Med* 1941 Jan Vol 46, No 1 pp 69-73 11 refs.
 † PALMER (P F). A Log of Human Rabies—*Jl Roy Army Med Corps* 1941 Apr Vol 6 No 4 pp 229-232 With 1 fig.

iii Pathology

PALAWANDOW⁴ reports 30 cases of shock amongst 2,725 persons inoculated in 1937 with Fernu's Vaccine. He has carried out a number of experiments in an endeavour to arrive at an explanation of this phenomenon. Inoculation directly into the blood stream of rabbits was found to be toxic and in high doses fatal. The presence of phenol increased the toxicity. Emulsions of dried cords were more toxic than those of fresh material. Filtration removed toxicity. Post mortem examination revealed the presence of multiple thrombi in lungs, brain and other organs.

Of four rabbits immunized by GRIASNOW and SUSLOWA⁵ with PHILIPP's vaccine and subsequently inoculated subdurally with fixed virus three remained healthy. The brains of these survivors killed fifteen days after the infection were washed through the carotid with physiological saline and an emulsion of equal parts of these brains and of the brains of the rabbits which had succumbed to rabies was prepared and allowed to stand for 48 hours. This emulsion (1 in 1 000) was inoculated intracerebrally into other rabbits all of which died of rabies after 4 to 5 days. The brains of the immunized rabbits thus contained no rabicidal antibodies.

iv Methods of Treatment and Statistics

WEBSTER⁶ gives a brief summary of the work in which he and other American workers have been engaged during the last 5 years. This had its origin in the mouse diagnostic test devised by WEBSTER and DAWSON and some 18 communications have appeared which deal with the various applications of the mouse technique. These have been reviewed individually in this *Bulletin*. The ground covered has been the examination of commercial vaccines and attempts to improve them, the characteristics of culture and allantoic vaccines, attempts at concentration, the use of chloroformized vaccines, irradiation of the vaccine, etc. The American workers are to be congratulated upon the thoroughness of their investigations and on the setting up of a method which can be used as a standard, and which should bring the future work of investigators in the various laboratories into line.

A series of experiments has been carried out by HABEL⁷ with a view to finding what factors influence the titre of the animal brains supplying the virus and thus to obtain a vaccine in which the virus content will be as great as possible. He suggests that the passage dose should be 0.2 to 0.25 cc. of a 1 in 1 000 dilution of the supernatant of the previous passage brain and that higher concentrations give less favourable results (the evidence for this suggestion is unconvincing).

⁴ PALAWANDOW (G.) Ueber die Toxizität der Hirn-emulsion bei intravenöser Einführung.—*Jl Microbiol. Epidemiol. et Immunobiol. Moscow* 1940 No 8 [In Russian pp 73-77. German summary.]

⁵ GRIASNOW (V.) & SUSLOWA (M.) Rabische Antikörper und die Unempfindlichkeit bei Tollwutschutzimpfungen.—*Jl Microbiol. Epidemiol. et Immunobiol. Moscow* 1940 No 8 [In Russian pp 71-72. (18 refs.) German summary.]

⁶ WEBSTER (Leslie T.) Antirabic Vaccination—Present Status.—*Am. J. Public Health* 1941 Jan. Vol 31 No. 1 pp. 57-59. [18 refs.]

⁷ HABEL (Karl). Factors influencing the Efficacy of Phenolized Rabies Vaccines. II. Virus Content of Vaccine.—*Public Health Rep.* 1941 Mar 25 Vol 58, No. 13, pp 641-649. [13 refs.]

that the rabbit should be killed after it has been completely paralysed for 1 or 2 days—that the method of killing is immaterial—and that the brain may be kept for a short period of time in 50 per cent. glycerine preferably at -10°C or lower.

Using culture virus which had been irradiated [this *Bulletin* 1941 Vol. 38 p. 161] HUGHES WEBSTER, and LAVY found that for mice, 1 cc., containing 50 000 mouse intracerebral doses, was necessary to give good protection. Beagle dogs weighing about 500 times as much as a mouse required 500 times the mouse dose or 500 cc. As this volume was impracticable attempts were made to raise the titre in the tissue culture but without success. A tenfold concentration of culture virus was however obtained (without loss of immunizing potency) by freezing and drying procedures. As this concentrated vaccine would need to be given to dogs in doses as large as 50 cc. recourse was had to infected mouse brain as a source of virus. WEBSTER and CASALS¹¹ report that this virus is fatal in 10^{-7} dilution and that if a 1 per cent. suspension is centrifuged the supernatant is lightly opalescent and can be rendered non-virulent by exposure to ultra violet light for less than 30 minutes. This material in a single injection of 0.1 cc. (containing before irradiation 50 000 doses) immunizes mice adequately. It was then tested in dogs with the following results. Eight beagle dogs weighing about 300 times as much as the mice were given intraperitoneally a single dose of 30 cc. of non-virulent irradiated vaccine, eight were given 10 cc. three times at weekly intervals, eight received 6 cc. of commercial chloroformized 20 per cent. vaccine, and eight were left unvaccinated as controls. After 4 weeks an infecting dose of 0.25 cc. of a 5 per cent. street virus was given to each dog in the muscles of the neck of each side. All the controls died of rabies, 4 of the 6 treated with chloroformized vaccine died similarly, whilst of those treated with the irradiated vaccine none died.

LEACH and SHAMSHAN¹² have examined the immunizing properties of vaccine which has been submitted to ultra-violet light. A 10 per cent. emulsion of passage virus was filtered and centrifuged. The supernatant fluid was subjected to the rays for 15–20 minutes. This vaccine was injected in doses of 0.5 cc. intraspinally 5 times during 5–7 days. Five days after the last injection, 3 rabbits received a test dose of 0.05 cc., 5 a test dose of 0.1 cc. and 5 a dose of 0.25 cc. of a 10 per cent. emulsion of virulent virus injected intraspinally. All the animals remained alive and well.

LEACH and JOHNSON¹³ have extended the investigation described in the last review [this *Bulletin* 1941 Vol. 38 p. 164]. The whole series of experiments may be summarized as follows:

WEBSTER (LARRY T.) & CASALS J. J. An Irradiated Non-Virulent Anti-Rabies Vaccine.—*Surv.* 1940 Dec. 27 Vol. 92, No. 7400 pp. 610–611 With 1 fig.

KARLHAR (VICTOR) & SHAMSHAN (LEO) Ueber die Schutzwirkung des mit ultraviolettem bestrahlten Lymphvirus.—*Klin. Woch.* 1940 Aug. 24 Vol. 18, No. 34 p. 866

¹¹ LEACH (CHARLES V.) & JOHNSON (HAROLD V.) Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Subcutaneous Injection Method with Chloroform-treated Vaccine.—*Amer. J. Hyg.* 1940 Nov. Vol. 32, No. 3, Sect. B pp. 4–7

¹² JOHNSON (HAROLD V.) & LEACH (CHARLES V.) Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Intraperitoneal Injection Method with Phenol-treated Vaccine.—*Amer. J. Hyg.* 1940 Nov. Vol. 32, No. 3, Sect. B pp. 69–73

	Vaccinated			Controls		
	Total dogs	Died of rabies	Percentage	Total dogs	Died of rabies	Percentage
1 Commercial phenol treated vaccine given in a single subcutaneous injection of 5 cc.						
2 The same but given intraperitoneally	105	26	24.8	120	66	55.0
3 Commercial chloroform treated vaccine in single subcutaneous dose of 5 cc.	52	19	36.5	63	34	54.0
	50	2	4.0	55	34	61.8

The chloroform treated vaccine was prepared according to the method of KESLER. [See this *Bulletin* 1931 Vol. 28 p 747 and SCHOENING *ibid* 1930 Vol 27 p 754] Thus the chloroform treated vaccine produced a significantly higher degree of protection than the phenol vaccine when the same amount of vaccine was administered and when the test inoculation was given one month after vaccination. Antirabic treatment in Palestine¹² has now been completely decentralized. Of 1,894 persons who received treatment during 1939 4 died of rabies all within 15 days after completion of treatment. No neuromuscular accidents occurred.

v Paralytic Accidents

HERRON¹³ discusses the incidence aetiology symptoms pathology and prognosis of paralytic accidents following antirabic treatment and describes a fatal case of the Landry type

vi Rabies in Animals

A short summary of our knowledge regarding rabies in the tortoise the hedgehog the bat and the mongoose is given by GREVAL and NICHOLAS¹⁴. One of the authors (GREVAL) has previously suggested that rabies smoulders in forests and flares in human habitations. It is now suggested that it may occur even in the lower animals which may not be much inconvenienced by it.

A G McEndrick

¹² PALESTINE DEPARTMENT OF HEALTH. ANNUAL REPORT FOR THE YEAR 1939 [HERRON (G W) Director of Medical Services] Section viii Laboratory Services [STUART (G) Deputy Director (Labs)] pp 99-102 110-112 & map facing p 92.—Anti-Rabies (Pasteur) Institute.

¹³ HERRON (Paul H) Fatal Paralysis following Antirabic Treatment.—*New Orleans Med & Surg J* 1941 Mar Vol. 83 No. 9 pp 448-450 [11 refs.]

¹⁴ GREVAL (S. D S) & NICHOLAS (M. J) Rabies in Lower Animals.—*Indian Med Ga.* 1940 Dec. Vol. 75 No. 12. pp 739-740

VAN STOCKUM (Maria J Otten) Rabies-onderzoekingen. [Rabies Investigations.]—*Geneesk. Tijdschr v Nederl Indië*. 1941 May 13 Vol 81 No. 19 pp.1002-1073. With 1 graph. [18 refs.]

The long and patient experimental work on rabies of Mrs. M J Otten-van Stockum is very well known. It is sad to hear that such highly specialised investigation has come to an untimely end. Dr Otten presents the case for Dutch readers of the results so far obtained and also the views regarding their statistical analysis which were originally given in an English work *New Principles of Antirabic Treatment and Rabies Statistics* [this *Bulletin* 1935 Vol 32, pp 612-618]. Such views are necessarily controversial, but it may suffice here to give the conclusions which are now reached after a further period of trial and experiment. These are —

1. The mortality from rabies among the untreated is of no value for the estimation of the effect of the treatment.

Apart from the number of the treated, it is the distribution of the cases according to the incubation time which gives a satisfactory appreciation of the effect of treatment. Account must, of course, be taken of the interval between bite and beginning of treatment.

3. By application of this fairly reliable statistical test it would appear that all known methods of treatment are failures. Only the use of monkey brain virus, whether living or killed by formalin, leads to satisfactory results.

4. This finds its confirmation in the animal experimentation provided that definite controls are taken into account.

5. An experimental research over many years demonstrated that the effectiveness of a fixed vaccine virus is dependent on the species of animal from which the vaccine is prepared as well as on the type and concentration of the Abxidal reagent used.

6. By the use of 10 per cent suspension of monkey brain and formalin in 1.3 per thousand concentration, after exposure to a temperature of 3° C for 5 days a fixed vaccine virus of superior activity is obtained, for both animal experiment and the treatment of human beings.

H F Harvey

MALARIA

PRELIS OF ABSTRACTS IN THIS SECTION

WIGGLESWORTH (p 500) discusses biological research in relation to malaria and war.

FIELD and LE FLEWING (p 501) describe the morphology of *Plasmodium malariae* in thick blood films and FIELD (p 501) discusses the differential diagnosis of the three common parasites.

On the China Burma highway ROBERTSON (p 501) reports that in the low lying plains subtertian malaria is the most prevalent form, but that benign tertian is dominant at high altitudes. *A. minimus* is almost certainly the chief vector and it is where this is abundant that subtertian malaria is prevalent. WILLIAMS (p 502) also discusses malaria on this highway. The commonest form is subtertian. Control measures are mentioned, and if applied in town and labour camps should solve the problems which have most hindered the construction and use of the road.

BATES (p 502) gives details of his method of rearing *Anopheles maculipennis* with particular reference to combinations of salts used in the water. LEKHCHER (p 503) discusses the behaviour of *Anopheles maculipennis* in the Province of Moscow giving his reasons for believing that most mosquitoes are infected from latent or relapsed cases in June. Workmen are attacked while in the peat bogs but since the introduction of aircraft for dusting Paris green the mosquito population of these bogs has been considerably reduced. Control of mosquitoes alone however is not regarded as sufficient to eliminate malaria but should be supplemented by medical treatment of the whole population in spring.

WHITE (p 504) shows that although *A. culicifacies* is an important vector in the Trans Indus and upper Ganges areas it is not an effective vector in the north and south Gangetic plains. No satisfactory explanation of this anomaly is forthcoming and there are no reasons to suppose that two races of the mosquito exist. He (p 505) reports that neither the type nor the *mysorensis* form of *A. stephensi* has been found infected in Calcutta both are attracted to cattle rather than to man.

THOROUGHMAN (p 505) shows that in Soochow attacks of malaria frequently follow blood transfusion even when parasites cannot be found in the blood of either donor or recipient. In a small series such attacks did not occur if the recipients were given prophylactic quinine after transfusion. The attacks may be due to parasites in the transfused blood or to activation of latent malaria in the recipients (but no mention is made of the freshness or length of preservation of the transfused blood).

ARMENTANO and BE TSÁTH (p 506) describe two cases in which chronic splenomegaly was revealed as due to malaria by the finding of parasites in red cells obtained by sternal puncture although there were no parasites to be found in the peripheral blood. The authors claim to have seen both pigmented and non-pigmented forms in the sternal cells. In comment WENYON remarks on the anomaly of this assertion.

Recording results with the Henry test ASAI (p 507) states that though of value in acute and chronic stages it cannot be relied upon as an indicator of cure. OU (p 507) presents the results of the Takata reaction in malaria.

FAWCITT and WALTERS (p 508) obtained a strikingly good response with intravenous reconstituted serum in a patient gravely ill with subtertian malaria which had not responded to quinine and atabrin.

In the *Annals of Tropical Medicine and Parasitology* (p 508) it is stated that biological tests confirm the findings in chemical tests that the British pamaquin is identical with plasmoquine.

WATSON (p 509) states that in oil all substances which are toxic to mosquito larvae are soluble in water and capable of penetrating the cuticle. The heart is very susceptible to these substances which are also capable of killing the micro-organisms in water. The entry of oil is due to efforts to clean the spiracles and it is drawn along the tracheae as a result of absorption of oxygen by the tissues.

STAROSTIN (p 509) shows that the dusts which make the best vehicles for Paris green for use in aircraft are those which are least compressible and which do not therefore form lumps and those which are least hygroscopic. Road dust containing river or desert sand is good since

the particles are polished and rounded and do not clog. LAZUK (p. 510) discusses the dusting of Paris green from aircraft in Western Russia, showing that for large peat bogs it is economical and effective.

POGODIXA and SOKOLOV (p. 510) discuss the production of aerosols or mists from anabarsin which are very lethal to mosquitoes inside buildings. Details of technique are given. In the *Science News Letter* (p. 511) is a reference to the attempts made to control the spread of *Anopheles gambiae* in Brazil by larvicides and fumigation of transport facilities.

CLARK *et al.* (p. 511) report on the tenth year of malaria control in Panama by means of drug treatment of all infected persons. Drug control alone cannot prevent epidemic outbreaks if *Anopheles* are numerous but severe clinical malaria may be almost eliminated with the result that labour efficiency is increased. MORIJ (p. 512) describes the measures of malaria prevention taken in the Royal Netherlands Indies Army.

By single parasite infections COLLSTON and MAXWELL (p. 512) have shown that pigmented forms of *P. circumflexum* can give rise to pigment free forms but only after long delay which suggests that pigment free forms only develop when the defensive mechanism of the host is severely taxed. MAXWELL (p. 513) records a similar finding with *P. reticulatum* var. *maindriani*. PORTER and HUFF (p. 513) review the question of erythrocytic schizogony concluding that although these schizonts may be developed from sporozoites they may also arise from erythrocytic forms. Bodies resembling these schizonts have been seen in monkey and human malaria (benign and subtertian). C II

WIGGLE WORTH V. B.: Malaria in War—*Nature* 1941 Apr. 12.
Vol. 147 No. 3728. pp. 436-439.

The object of this paper is to illustrate the ways in which pure biological research can help the practical man. The author first gives certain figures which demonstrate the importance of malaria in influencing military operations in the Mediterranean countries and in Africa during the war of 1914-18. He then briefly refers to the known vector in those regions, discussing the question of the races of *Anopheles maculipennis* at some length.

In the Army the general plan has been to establish mobile malaria laboratories, with malarologists and entomologists who will undertake investigations and advise on the problems raised. In prevention under war time conditions the use of mosquito nets and of insecticidal sprays should be encouraged wherever these measures can be applied. The principles of the control of breeding are mentioned—alteration of salinity, flushing, oiling and the dusting of Paris green. The qualities of oils used, and the need for further investigation are discussed, and the author finally refers to the importance of a close study of mosquito habits, illustrating his remarks by quoting the recent work on *A. minimus* conducted in Assam by R. C. MURHEAD THOMSON (see this *Bulletin* 1941 Vol. 38 p. 335).

The paper summarizes the subject in a clear and authoritative manner. It may with advantage be read in conjunction with that of CHRISTOPHERS, abstracted in this *Bulletin* 1940 Vol. 37 p. 174.

C II

FIELD (J W) & LE FLEMING (H) *The Morphology of Malarial Parasites in Thick Blood Films. Part III Plasmodium malariae—Trans Roy Soc Trop Med & Hyg* 1941 Jan 31 Vol. 34 No 4 pp 297-304 With 1 fig & 4 plates (2 coloured)

This the third paper of the series dealing with the morphology of malarial parasites in thick blood films describes the appearance of *Plasmodium malariae* As is the case with the previous papers [this *Bulletin* 1940 Vol. 37 pp 56-739] the description has to be followed carefully with the black and white and coloured drawings and microphotographs With the help of these papers and a certain amount of practical experience the identification of the species of the parasites seen in thick films should be a relatively easy matter

C M Henson

FIELD (J W) *The Morphology of Malarial Parasites in Thick Blood Films. Part IV The Identification of Species and Phase—Trans Roy Soc Trop Med & Hyg* 1941 May 27 Vol 34 No 6 pp 405-414 With 15 figs. on 5 plates

In this paper the fourth of the series dealing with the morphology of malarial parasites in thick films the author considers the differential diagnosis of the three common species He discusses young non-pigmented trophozoites older trophozoites with commencing pigmentation schizonts gametocytes and mixed infections There are five plates of illustrations which, with their detailed descriptions should enable anyone to become proficient in the identification of malarial parasites by the methods the author employs

C M H

ROBERTSON (R Cecil) *A Malaria Survey on the China Burma Highway—Trans Roy Soc Trop Med & Hyg* 1941 Jan 31 Vol 34 No 4 pp 311-332 With 2 maps & 10 figs on 4 plates

This report is an amplification of a previous publication [see this *Bulletin* 1940 Vol 37 p 792] It contains an interesting account of the genesis of the China Burma Highway of the topography of the country through which it passes and of the great engineering difficulties surmounted in its construction and upkeep Attempts to obtain information regarding the intensity of local endemic malaria were hampered by language difficulties and the fact that the Shan people and native tribesmen resent anything in the way of systematic medical examination The paper is concerned chiefly with the western portion of the highway between the Salween River and the Burma frontier it is this portion of the road which passes through country in which malaria prevalence is highest

In the low lying plains subtertian malaria is most prevalent at high altitudes benign tertian is most in evidence Quartan infections were rare except in one town Seventeen species of Anophiles were collected at different places visited in Yunnan 4 *jamesi* and 4 *lesselatus* are reported from this province for the first time 4 *hyrcanus* var *sineusis* is the most prevalent species though infected specimens were found the author does not consider it to be one of the most important vectors *A minimus* is almost certainly the chief vector where this species is abundant subtertian malaria is prevalent

Norman H Fife

Williams (L. L.) Jr. Malaria on the China Burma Highway—
Am J Trop Med 1941 Jan Vol 21 No 1 pp 1-11
 With 1 chart.

This is a presidential address. It contains an interesting, though necessarily brief, account of the activities of a commission that was sent by the United States to co-operate with the Chinese National Health Administration. The task of the Commission was to determine the nature of epidemics along the China Burma Highway to suggest methods for their control and to train a group of Chinese doctors in such methods.

A brief description is given of the Highway from Kunming, the capital Yunnan to the Burma border a distance of 625 miles. The malarial epidemic disease of importance was found to be malaria. Along the eastern end of the road malaria is not very prevalent although the western end malaria is hyperendemic. South-west Yunnan has always had an unsavory reputation as the home of a deadly disease climatic which is malarial tertian malaria. The indigenous population in south-west Yunnan is not Chinese. In the valleys here malaria is very rare. Other aboriginal tribes notably the Kachins and Lolo, inhabit high-altitude where malaria is all but absent. The highest spruce and parasite were found in Chefoo and here the headquarters and laboratory were installed. The spleen rate of 25% in Chefoo was 81.4 and the parasite rate 52.9 per cent. These were endemic malaria. All the enlarged spleens were hard and extended some 4-5 cm from the navel. Of the parasites found 30 per cent were *P. vivax* 67 per cent *P. falciparum* and 3 per cent *P. malariae*. Between December and May eleven thousand *An. sinensis* were collected. *An. sinensis* was the only vector. Control measures included spraying with DDT, local bamboo larvae (oil and lime) and bamboo. Such measures should secure adequate protection for labor camps and headquarters towns and thus solve the principal health problems which militated against the building of the road and which have slowed on the delivery of supplies.

V II

Bates Marion Studies in the Technique of raising Anopheline Larvae—*Am J Trop Med* 1941 Jan Vol 21 No 1 pp 103-112

In a previous paper Bates 1938 the author described the results obtained in rearing anopheline mosquitoes using various chemical media. The present paper describes results obtained when using a combination of mineral salts.

The salts necessary for calcium in raising *Anopheles* larvae is obtained by the pure calcium sulphate was found to be not so good as the commercial product. Commercial gypsum, used for making plaster, was found to be an excellent larval medium. Experiments showed calcium chloride in a dilution of one part per thousand to be

about the optimum at least when rearing *A. maculipennis* var. *atroparvus*. Potassium nitrate was injurious even in minute quantities and chloride and phosphate appeared to be unnecessary.

As routine media, grass sods seemed to give the best results. The virtue of this method appeared to be in the mud—suspensions of the mud gave as good results as the sod itself. But the type of water and mud had some influence on larval growth. The good results obtained by using mud are attributed to the presence of mineral or organic food.

As an organic food for raising *Anopheles maculipennis* var. *atroparvus* dried bread crumbs seemed to be the most satisfactory, especially so when the water contained 0.5 per thousand calcium sulphate 0.5 sodium chloride and 1.0 magnesium sulphate and apparently an absence of potassium nitrate.

In this paper the author has described the varieties of *A. maculipennis* as though they were separate species. The effect of light on larval development is not mentioned.

There are nine tables in the paper showing the influence of various media on larval survival and development. The paper is divided into ten headings, which include Method. Standard media. Inorganic salts. Organic foods. Routine media (grass sods). Experiments with water and mud. Routine method of larval culture. and Comparison between species. There are also an introductory section and a summary.

A. maculipennis all varieties, develop readily in pans containing soft water to which have been added sods of earth. Not all will agree with the author that it is necessary to change the water two or three times during development especially if the water is gently aerated for an hour or so each day while the larvae are in the first and second instars. The importance of obtaining sods of earth some distance from tarred roads and fences may also be considerable. The addition of any organic foods will often be found to be quite unnecessary when larvae are reared in pans containing large sods of earth, and overcrowding is well tolerated.

P. G. Skuse

REKHCHER, O. M.) Essais d'une liquidation d'un foyer paludien dans les exploitations de tourbe de Ozeretzkole. (Malaria Control in a Peat Bog in Ozeretzkole. — *Med. Parasit. & Parasitic Dis.* Moscow 1940 Vol. 9 No 1-2. In Russian pp. 12-30. With 5 graphs. French summary. Summarized in *Rev. Applied Entom.* Ser. B 1941 Feb Vol. 29 Pt. 2 pp. 23-2.]

An intensive anti-malaria campaign was carried out in 1935 and 1936 in a peat bog district in the Province of Moscow where *Anopheles maculipennis* Mg. was abundant, its breeding places in order of decreasing importance being temporary accumulations of water densely covered with vegetation and well exposed to the sun, lakes formed by disused turf pits with an abundant growth of *Elodea canadensis* and low sloping banks overgrown with sedge, recently cut turf pits only sparsely covered with vegetation and ditches. The incidence of malaria was also favoured by the scarcity of cattle (24 cows among a population of 1,500) and the bad condition of the workmen's huts which were damp, dark and badly ventilated and

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A brief description is given of the Highway from Kunning, the capital of Yunnan to the Burma border a distance of 625 miles. The only epidemic disease of importance was found to be malaria. Along the eastern end of the road malaria is not very prevalent. Along the western end malaria is hyperendemic. South-west Yunnan has always had an unenviable reputation as the home of a deadly disease, chanchi, which is malignant tertian malaria. The indigenous population in south-west Yunnan is not Chinese. In the valleys between 2000 and 5000 feet Shan predominate, here malaria is very rare. Other aboriginal tribes, notably the Hachims and Lolo, inhabit higher altitudes where malaria is all but absent. The highest spleen and parasite rate were found in Chelang and here the headquarter and laboratory were installed. The spleen rate of 23% children in Chelang was 61.8 and the parasite rate 52.3 per cent. These were midwinter rates. All the enlarged spleens were hard and extended varying distances from the midpoint between the umbilicus and mid margin to the umbilicus. Of the parasites found 30 per cent were *P. vivax* 67 per cent *P. falciparum* and in 3 per cent there was mixed infection. Between December and May eleven species of Anophelinae were identified. 4 species var. *sinensis* was most prevalent. *A. sinensis* was the only vector. Control measures included the principal of drainage with vector of local bamboo larvae (oil and Parathion emulsion and Paris green). The propagation of shade bushes and Gambusia (such measures should secure adequate protection for labour camps and headquarter towns and thus solve the principal health problems which militated against the building of the road and which have slowed up the delivery of supplies.

V. II

BATE Marston. Studies in the Technique of raising Anopheline Larvae.—*Am J Trop Med* 1941 Jan Vol 21 No. 1
 pp 103-122

In a previous paper (Bates 1939) the author described the results obtained in rearing anopheline mosquitoes using various chemical media. The present paper describes results obtained when using a combination of mineral salts.

The absolute necessity for calcium in raising Anopheline larvae is stressed, but the pure calcium sulphate was found to be not so good as the commercial product. Commercial gypsum, used for making plaster, was found to be an excellent larval medium. Experiments showed sodium chloride in a dilution of one part per thousand to be

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As routine media grass sods seemed to give the best results. The virtue of this method appeared to be in the mud suspensions of the mud gave as good results as the sod itself. But the type of water and mud had some influence on larval growth. The good results obtained by using mud are attributed to the presence of mineral or organic food.

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P. G. Shute

KEKHCHER (O. M.) Essais d'une liquidation d'un foyer paludien dans les exploitations de tourbe de Ozéretzkoie. [*Malaria Control in a Peat Bog in Ozéretzkoie.*]—*Med. Parasit. & Parasitic Dis.* Moscow 1940 Vol. 9 No. 1-2. [In Russian pp. 12-38. With 5 graphs. French summary.] [Summarized in *Rev. Applied Entom.* Ser. B 1941 Feb. Vol. 29 Pt. 2. pp. 22-23.]

An intensive anti malaria campaign was carried out in 1935 and 1936 in a peat bog district in the Province of Moscow where *Anopheles maculipennis* Mg. was abundant its breeding places in order of decreasing importance being temporary accumulations of water densely covered with vegetation and well exposed to the sun lakes formed by disused turf pits with an abundant growth of *Elodea canadensis* and low sloping banks overgrown with sedge recently cut turf pits only sparsely covered with vegetation and ditches. The incidence of malaria was also favoured by the scarcity of cattle (24 cows among a population of 1500) and the bad condition of the workmen's huts, which were damp dark and badly ventilated and

had cracks in the walls so that the mosquitos readily penetrated to the interior and sheltered there during the day. Data given on the seasonal occurrence of 4 *maculipennis* during the two years and the fact that malaria parasites were found in the peripheral blood most frequently in June indicate that the mosquitos of the first generation which emerge in June are epidemiologically the most important. From consideration of the effect of the local summer temperatures on the developmental cycle of the parasites in the mosquito and of the incubation period in man it is concluded that fresh cases of malaria cannot occur before mid-July and can serve as sources of infection for the mosquito only in August when most of the females have a developed fat body and are inactive. It follows therefore that the chief sources of infection for the mosquito are latent cases and relapses. The author suggests that the parasite responsible is a strain of *Plasmodium* (that has a prolonged period of incubation and is most active in man in spring. In tances of infection with *P. falciparum* also occur however and malaria is endemic owing to the constant influx of workmen, many of whom are infected, from other parts of the Russian Union.

Considerable protection was afforded by intensive screening of the workmen huts and the use of mosquito nets. During 1935 relatively few mosquitos were taken in screened huts, and the majority had not fed evidently because they had no access to the people under the nets. It appears that the mosquitos had suitable shelter and food in nature as of several thousand that were trapped and released in the peat bog in 1936 only 10-15 were found in the huts on each of the three following days. It seems therefore that attacks on the workmen in the turf pits are unavoidable. Systematic daily catches of mosquitos in houses, cow beds and latrines caused a marked decrease in the percentage of older females and dusting the breeding places from an aeroplane considerably reduced the mosquito population in the second half of the season. It was supplemented by spraying from the ground with a waste machine oil which proved an effective larvicide though the larvae remained alive under the film for 14-18 hours or by dusting with a mixture of 1 part Paris green and 20 parts sifted peat.

From these investigations the author concludes that the control of mosquitos alone is insufficient to eliminate malaria in the locality. An intensive campaign against the disease in man is essential and medical treatment of the entire population should be carried out in spring.

WHITE (R. SENIOR). Studies on the Behaviour of Adult *Anopheles culicifacies*. Part III. Dissection Records.—*Jl. Malaria Inst. of India* 1940 Sept. Vol. 3, Nos. 2 & 3 pp. 363-382. With 1 folding map.

The author discusses the importance of *Anopheles culicifacies* as a vector of malaria in different parts of India and Ceylon.

Until a few years ago it was assumed that *A. culicifacies* was a carrier in every area in which it is found. But in 1937 Senior White showed that though common in the Javore Hills and though malaria was also common this species was not infected.

In the present paper the author arranges a great number of records of dissections (3144) from many parts of India, classifies them under

11 areas (for India) and sets them down on a map. Data from Ceylon are included. The results are striking. If one excludes dissections made in epidemics one gets such results as —

Area	Total dissected	Sporozoite rate per cent.
Trans-Indus	2 072	2.3
Indus—Upper Ganges	12,267	0.40
North Gangetic Plain	3 205	0.06
South Gangetic Plain	2 210	0.00

In the first of these areas the species is unquestionably a vector and probably it is in the second (the low rate of infection being counter balanced by the insect's abundance). In the third and fourth areas it is not an effective vector.

No satisfactory explanation is forthcoming and detailed studies on the dimensions of eggs give no ground for thinking that two races exist. Careful anatomical studies of all stages in the life cycle are called for.

P. A. BURTON

WHITE (R. Senior) *Anopheles stephensi* in Calcutta.—*Jl Malaria Inst of India* 1940 Sept Vol. 3 Nos 2 & 3 pp 349-361 [20 refs]

1 Both the type and the *mysorensis* form of *A. stephensi* are found in Calcutta. In recent years the type form has suddenly become very rare.

2 The maxillary indices of the two forms differ but the numbers examined do not permit it to be stated that the difference is significant.

3 The fertility of the *mysorensis* form in captivity is very low.

4 Both forms in Calcutta are attracted to cattle rather than to man. Neither form has been found infected on dissection. The daytime resting places remain obscure.

THOROUGHMAN (J. C.) *Malaria Transmission by Blood Transfusion*.—*Chinese Med Jl* 1940 Dec Vol. 58 No. 6 pp 682-686 [12 refs]

In the hospital at Soochow, Kiangsu, China, 457 blood transfusions were given to 284 patients during a period of a year and a half. The donors were for the most part coolies. Malaria is endemic in Soochow. Although the blood of the donors was examined before transfusion the transmission of malaria infection by such transfusion appears to have been a common occurrence. From the statistical information produced it is not possible to determine the frequency of such transmission of malaria infection. It was not possible to exclude the possibility of latent malaria infection in the patients treated. One hundred and four patients gave no history of recent malaria; no parasites were found in their blood on admission to hospital. They received 176 blood transfusions. Forty-five of these 104 patients developed malaria within a period of 20 days following the transfusion. There were 25 *P. vivax* and 12 *P. falciparum* infections; in 8 cases the species of

parasite was not determined. The attacks of malaria were readily controlled by quinine. There was no case among 34 patients who received prophylactic quinine for three days after transfusion.

V II

ARMENTANO (L.) & BENTLEY (A.) Die Bedeutung der Sternalpunktion bei der Differentialdiagnose der Splenomegalien. Value of Sternal Puncture in Differential Diagnosis of Splenomegaly — *Klin. Woch.* 1940 Nov 18 Vol 19 No 48 pp 1199-1199

In describing two cases of malaria in which the diagnosis was not established till parasites were revealed by sternal puncture the authors outline recent developments in our knowledge of malarial plasmodia, particularly with regard to the existence of exoerythrocytic schizogony which takes place in the internal organs and in most cases intervene between the introduction into the body of sporozoites and the appearance of pigmented parasites in the red blood corpuscles. These exoerythrocytic forms, which are non-pigmented, occur in cells of the reticulo-endothelial system and have given rise to the conception of malaria as an infection not only of the red blood corpuscles but of the reticulo-endothelial system also.

One of the cases was that of a woman, 55 years of age who was suffering considerable embarrassment from a greatly enlarged abdomen. This was found to be due to an enormous spleen which extended to the right iliac crest. The patient was kept under observation for some time. There was no fever the blood changes were slight and repeated blood examinations failed to reveal malarial parasites even after provocative doses of adrenalin. The patient was again seen nine years later when she was found to be in much the same condition, apart from the fact that now rigors and fever occurred regularly every fourth day. Blood examinations carefully carried out by them and thick films again failed to reveal any malarial parasites. Finally sternal puncture was performed and in smears of the material obtained *Plasmodium malariae* was found in fairly large numbers. Not only were pigmented parasites present but also non-pigmented forms which are said to resemble those described by RAFFAELLI in the bird malarial parasites *P. donghaii* and *P. relatum*. As regards gametocytes macrogametocytes alone were present. The patient was given atabrin treatment which had no influence on the spleen. Accordingly plasmogone was administered in a dose of 2 gms twice a week. There was a rapid response the spleen shrinking to half its size in three months and to a third in four. After a further four months the organ had returned to its normal size.

The second case was in a man 30 years of age who suffered from epigastric pain of such intensity that he had to be given hyalophia. There was some enlargement of the liver and spleen but no fever. Symptoms indicated involvement of the gall bladder for which appropriate treatment was adopted. As the patient did not recover sternal puncture was carried out with the result that *Plasmodium vivax* both pigmented and non-pigmented forms was discovered. Treatment with atabrin and plasmogone brought about complete recovery.

Discussing these cases the authors ask why it was that the malarial parasites which were always within red blood corpuscles did not make

their way into the blood. They can only suggest that the explanation may be similar to that which accounts for the appearance in the peripheral blood of nucleated red blood corpuscles, myeloblasts and myelocytes only under certain pathological conditions. [The statement that the parasites seen in the two cases were always within red blood corpuscles and never in reticulo-endothelial cells is difficult to reconcile with the assertion that both pigmented and non pigmented parasites were seen.]

C M W

ASAI (Masaaki) Zum Studium der Serodiagnostik der Malaria I. Mitt. Ueber die Henrysche Reaktion insbesondere vergleichendes Studium von Netzhautmelanin und Villain Dupoux'scher künstlichen Melanin als Reagenzien. [On Henry's Reaction in the Diagnosis of Malaria.]—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1940 Nov Vol. 39 No 11 [In Japanese pp 1836-1848 [33 refs] German summary pp 1848-1849]

In order to test the value of Henry's reaction in the diagnosis of malaria and the utility of the Villain and Dupoux artificial melanin the author carried out parallel experiments in 153 cases of malaria with both reagents. In the one case the melanin was obtained from the choroid of the eye of the buffalo and in the other the artificial melanin was prepared according to the formula of Villain and Dupoux. His results are shown in the following table —

	Percentages of positives		
	Choroid melanin	Artificial melanin	Alkaline water
Acute malaria ..	76.0	68.9	28.0
Latent malaria	44.4	53.7	13.3
Chronic malaria with enlarged spleen	85.7	100.0	71.4
Under treatment	60.0	66.7	—
After treatment	28.5	32.1	—

[The numbers of patients in the different groups are not given in the German summary.]

The precipitation in alkaline water was taken as the control. Since the percentages of the reaction with the artificial melanin with the exception of the acute cases in which the percentage was somewhat lower were in general higher than with the eye melanin the author concludes that the artificial can replace the natural melanin. He considers that the test is of serological value in the acute and chronic stages of malaria. As however a few cases which were negative after treatment relapsed within two months the reaction cannot be relied upon as an indicator of cure of the disease.

E D W Greig

Ou (Telshun) Ueber die Takata Reaktion bei Malaria. [Takata-Reaction in Malaria.]—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1940 Nov Vol. 39 No 11 [In Japanese pp 1825-1833 German summary pp 1834-1835]

The author investigated the problem in 116 cases of different forms of malaria in Formosa. The sample of blood is taken in the morning

when patient is fasting this he considers important. He followed the method of Takata. The reaction was considered positive if flocculation occurred in three hours and in at least three tubes. In addition to flocculation he also paid attention to the occurrence of opacity after the addition of the Takata reagent. The results were in 24 healthy persons and 20 primary acute malaria cases the reaction was quite negative positive in 10 per cent (presumably three) of 30 patients who had relapsed and who had been ill for one year in 26.0 per cent presumably 13 of 50 old chronic cases with enlarged spleen and in 68.8 per cent presumably 11 of 16 old cases with enlarged spleen and liver. When opacity of the tubes was taken as an indicator the percentage of positive reactions was increased and even in the early acute cases positive reactions occurred further the opacity did not occur in cases of malaria which had been treated. A temporary flocculation frequently was noted when blood was taken after a meal. There was no parallel relationship between the Takata and Hirtz reactions in acute malaria although they coincided in chronic cases. There appeared to be no connection between the Takata reaction and liver damage.

E. D. W. Gregg

LAW, J. J. & WALTERS (V. H.) Acute Malignant Tertian Malaria. Treatment aided by Reconstituted Serum. [Memoranda]—Brit. Med. J. 1941 Jan 4 p. 14

An Indian seaman aged 33 was very gravely ill with malignant tertian malaria contracted at Freetown. In spite of treatment with atabrin and quinine his condition gave rise to considerable anxiety. The intravenous administration of reconstituted serum by the drip method 40 to 60 drops a minute was followed by striking improvement in the man's condition. The authors suggest that reconstituted serum acts by diluting and perhaps neutralizing the circulating malarial toxin. It may also minimize the quinine shock that is sometimes caused by toxically debilitated patients of this type.

A. H.

ANNAL OF TROPICAL MEDICINE AND PARASITOLOGY 1940 Dec 31 Vol. 34 Nos. 3 & 4 pp. 223-228 With 2 figs.—A Comparison of the Biological Action of Plasmoquine Dihydrochloride (Bayer) and Pamaquin Dihydrochloride (I.C.I.) [Miscellaneous]

Imperial Chemical Industries Limited have synthesized a substance pamaquin which is believed to be identical with plasmoquine (Bayer). Tests were carried out at the Liverpool School of Tropical Medicine to ascertain whether the biological effects of the two drugs were identical. These tests and their results are described. Toxicity tests were carried out in canaries, hens, mice and monkeys. The toxicity of the two drugs was similar. To compare their therapeutic action tests were made in infected canaries (*P. relictum*), fowls (*P. gallinaceum*), monkeys (*P. knowlesi*) and in man (*P. falciparum* and *P. malariae*). In each case strictly comparable results were obtained. The biological tests thus confirm the chemical view that plasmoquine (Bayer) and pamaquin (I.C.I.) are identical.

V. J. F.

WATSON (G I) A Physiological Study of Mosquito Larvae which were Treated with Anti-Malarial Oils.—*Bull Entom Res* 1941 Jan. Vol 31 Pt. 4 pp 319-330

This paper has been extracted from a thesis for the M D degree. It describes in detail the methods used by the author for observing the behaviour of single mosquito larvae in contact with oil and comparing the differences which occur with different oils. It is suggested that this procedure may be a useful one for arriving at efficient mixtures of anti malarial oils. All the toxic substances in oils are said to be soluble in water and capable of penetrating the outer cuticle of the larva. The initial entry of oil is attributed to the efforts of the larva to clean the spiracles and its passage along the tracheae to the removal of oxygen from the tracheal system in metabolism. Larvae with a non toxic oil in one trachea may moult and rid themselves of it. The heart is very susceptible to the water-soluble toxins in oils. Oils which kill micro-organisms in the water are the same as those which poison mosquito larvae. The control of the spiracular flaps is attributed to a relatively weak spring and not to the spiracular muscles. The evidence on which these and other conclusions are based is not given fully in this paper but presumably in the thesis referred to.

V B Wigglesworth

STAROSTIN (S T) Propriétés physico-mécaniques des ingrédients et leur influence sur le travail de l'aviapulvérisateur et la qualité de la verdissement par avion des collections d'eau anophélogènes [The Effect of the Carrier-Dust in the Use of Paris Green from Aircraft].—*Med Parasit & Parasitic Dis* Moscow 1940 Vol 9 No 1-2 [In Russian pp 71-77 12 refs.] [Summarized in *Rev Applied Entom* Ser B 1941 Feb Vol 29 Pt. 2. pp 24-25]

In the course of dusting with Paris green from an aeroplane against Anopheline larvae in the Province of Alma Ata (Kazakstan) in 1937 it was found that the effectiveness of the treatment largely depended on the carrier with which the larvicide was mixed. Road dust is the ingredient commonly used in Alma Ata and samples of dusts taken in various localities were therefore analysed. The results which are tabulated showed that road-dust from different regions possessed widely differing physical and chemical properties. The dusts that flowed best were those that showed little or no reduction in volume when submitted to pressure in a container. Dusts that became more compact formed lumps and flowed with difficulty or in extreme cases did not flow at all whether used alone or mixed with Paris green. In order to prevent the dust from becoming compacted the aeroplane should be flown as evenly as possible and jolting when taking off should be reduced to a minimum. The easy flow of the dust was also impaired if it was damp the least hygroscopic kind proving the best carrier. Dust that was exposed throughout the night to the open air became damp and clogged. Road-dust that consisted chiefly of sand and contained only a minimum number of particles of clay (smaller than 0.005 sq mm in size) had the most rapid and easy flow but much depended also on the type of sand. Thus river or desert sand was the most suitable as its particles are polished and almost oval in shape whereas that from mountains or foothills is

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administered. Atebrin and quinine are equally effective antimalaria drugs; atebrin is more readily administered. Plasmoquine simplex is not thought to have contributed much to the results obtained. Toxic symptoms from the use of plasmoquine were common, all tolerated atebrin well. Non-medical personnel can carry out reasonably good drug-control measures if supervised by a qualified physician. Weekly visits by the physician to labour camps are necessary. A drug control programme is economically justifiable; increased labour efficiency resulting therefrom is commensurate with the financial outlay.

During the year under review there was an increase in *Anopheles* breeding. In the month of August the malaria parasite rate in Rio Pivado, a village on an arm of Gatun Lake and comparable in every way with the Chagres villages but in which no medical treatment was undertaken, was 85.1 per cent. In the same month the malaria parasite rate in Chagres villages (atebrin and plasmoquine) 7.74 and in San Juan (quinine and plasmoquine) 6.4 per cent. The infections in the Rio Pivado group were much heavier than in those of the treated villages. Most of the malaria cases in the treated villages were relapses. Of the parasites found during the year 72 per cent were *P. falciparum*, 22 per cent *P. vivax* and 6 per cent *P. malariae*. Local hospital records show a greater prevalence of *P. vivax* than of *P. falciparum*. *P. vivax* causes somewhat more severe subjective symptoms. Of the 288 crescent carriers found only 24 harboured non-falciparous parasites to use in mosquito infection experiments. The highest incidence of malaria occurred in age-groups 5 to 10 and 10 to 20 years. V. W.

V. W. Malaria prophylaxis in het Koninklijk Nederlandsch Indische Leger. *Malaria Prophylaxis in the Royal Netherlands Indies Army*. *Geneesk. Tijdschr. v. Nederl. Indië* 1940, 5: 17-18, 41-42, 33 pp. 2231-2241. With 4 figs. on 1 lat. & 2 hart. English summary.

In 1937 the number of primary infections or reinfections was 158 in 1937 and only 47 in 1938, whereas among the hard population the corresponding figures were 1,393 and 2,141. In the former a 75 per cent reduction in the latter a 53 per cent increase. After 1937 no recommendations were made for mosquito-proofing the living room with wire of mesh of 1.25 mm. and the use of mosquito-net with at least 26 meshes to the inch. The mosquitoes used for tests were *Aedes aegypti*, *Culex fatigans* and *Anopheles subjectus*. For quinine prophylaxis a dose of 0.4 gm. (8 grains) daily is recommended though it is acknowledged that it will not prevent infection; it does, however, modify the severity of the attacks. H. H. S.

(CLISTON (Frederick) & MAXWELL (Reginald D.) Single-Parasite Infections and Exoerythrocytic Schizogony in *Plasmodium circumflexum*. Paper read at 16th Ann. Meeting of American Parasitologists. Abstract taken from *Supp. to J. Parasitology* 1940, Dec. Vol. 28, No. 6, p. 27.

"Despite the very considerable amount of study which has been given to the various problems associated with the occurrence of the pertinent free stages in malaria, the significance of these stages has been

questioned by some and much still remains to be discovered about them. In particular it has not yet been possible to rule out completely the possibility that such stages were in reality those of some parasite other than malaria, and—granting that they were stages of the malaria life-cycle—their origin has remained uncertain. Can they originate only from the sporozoites or from the erythrocytic stages or do stages in the red cells originate from the pigment free forms? To settle the question of significance and origin experiments to test the possibility of obtaining infections from single parasites were undertaken using *Plasmodium circumflexum*. The results proved positive in a number of cases both when isolation of single infected red cells using a Chambers micro-manipulation apparatus was employed and when dilution methods were used to secure inocula containing one or a very small number of parasites. In general infections obtained in this way were extremely light and occurred only after a long incubation period. None of the initial infections exhibited exoerythrocytic schizogony but after a number of passages this type of schizogony re-appeared and thereafter occurred quite regularly. Thus it is certain that the pigmented forms occurring in the erythrocytes can give rise to the pigment free forms but the delay in the appearance of the latter suggests that they only develop when the defensive mechanism of the host is severely taxed, as it is by a massive dose of parasites.

MANWELL (Reginald D.) *Life-Cycle of Plasmodium relictum var matulimum*—*Amer Jl Trop Med* 1940 Nov Vol. 20 No 6 pp 859-866 With 10 figs. on 1 plate [19 refs]

The paper gives the results of a study of the life history of *Plasmodium relictum* var *matulimum* in canaries infected either by blood inoculation or by mosquito bite. Certain differences between the variety studied and other strains of *P. relictum* are noted. Exoerythrocytic schizonts have been found in 9 of 18 birds examined and these include both blood inoculations and mosquito infections. In a footnote it is stated that after the paper was written a canary was infected by injection of a single parasite of the erythrocytic cycle and that in it exoerythrocytic schizonts were also found—a conclusive proof that these forms may arise from the erythrocytic stages. It was found that the exoerythrocytic schizonts did not differ from those of other species of bird malarial parasite. It was found however that the schizonts of a species of *Haemoproteus* of the song sparrow differed in certain respects. The mosquito transmissions employed were effected by *Culex pipiens*.

C M II

PORTER (Richard J.) & HUFF (Clay G.) *Review of the Literature on Exo-Erythrocytic Schizogony in Certain Malarial Parasites and its Relation to the Schizogonic Cycle in Plasmodium elongatum*—*Amer Jl Trop Med* 1940 Nov Vol. 20 No 6 pp 869-888 [109 refs]

In this review of the literature based on over 100 published papers the author shows that the exoerythrocytic schizonts have been observed in strains of *Plasmodium relictum*, *P. gallinaceum*, *P. cathe-merium*, *P. circumflexum* and *P. nucleophilum* but not in other species of bird malarial parasite. The schizonts of *P. elongatum* occur in

all blood and blood-forming cells but they are not large forms like the exoerythrocytic schizonts of other species. The evidence that these schizonts are developed from sporozoites is reviewed the conclusion being that though direct development from sporozoites occurs they may also arise from the erythrocytic forms. Bodies resembling to some extent the exoerythrocytic schizonts of bird malarial parasites have been seen in monkey and human malaria (*P. vivax* and *P. falciparum*). The paper is one which should be consulted by all those interested in these stages of development of malarial parasites.

C. M. W.

HELMINTHIASIS

PRECIS OF ABSTRACTS IN THIS SECTION

General — LI (p. 516) has found ova of helminths in 20 of 72 appendices which also contained either faecal material or faecaliths.

MALHO BAHR (p. 516) reports on phenothiazine as an anthelmintic in hookworm it is probably ineffective for roundworms it is useful but it is most satisfactory in threadworm infections. The details of dosage are given.

Nematodes — TOMITA (p. 517) has succeeded in infecting man with *Strongyloides fulleborni* but not with *S. papillorum*.

MATLEA (p. 517) describes some abnormalities of *Ascaris* eggs.

(HIXIAMCO and ORCULA (p. 517) describe the X-ray diagnosis of *Ascaris* in the alimentary tract.

MOHR and LIPPETT (p. 518) report on complement fixation tests, with an antigen prepared from a filaria of the S. American ostrich, in patients with helminthic infections of various kinds.

RAO (p. 518) found that elephantiasis was common in the town of Ratanpur Central Provinces, India and that *Mf. malayi* was the only embryo found. Species of *Mansonoides* were found breeding in the large tanks covered with *Pistia*. SACCHISAO (p. 518) gives an account of filariasis in the island of Boeroe.

MEYER and RAMANATHAN (p. 519) show that *in vitro* *Mf. bancrofti* remains alive in citrated blood for only 3 to 4 days, a relatively short time compared with its persistence in saline but that it is more active in the citrated blood than in the saline. Rupture of the sheath and escape of the embryo takes place in citrated blood, the process being the same as that observed in the stomach of mosquitoes containing infective blood. This process is described. KOBAYASHI (p. 520) gives instructions for the staining of microfilariae in smears, and describes the organization of *Mf. bancrofti*.

HU (p. 520) found *Culex pallidithorax* to be susceptible to infection with *Mf. bancrofti* but as this mosquito is not commonly found in

houses it is unlikely to be important in transmission KARIADI (p 520) states that the variety known as *Anopheles hyrcanus* λ is able to carry *W. malayi* though not so well as *A. barbirostris*

From examination of sternal marrow NAPIER *et al* (p 521) find no evidence that microfilariae shelter in the bone marrow by day or that they are destroyed by the marrow

DE SAVITSCH (p 521) states that the only satisfactory treatment for elephantiasis of the scrotum is surgical and gives advice based on his experiences on a number of technical points.

SUMMERS (p 522) shows that fleas of various species are not only suitable intermediate hosts for *Dirofilaria immitis* but are more important in transmission than had previously been supposed.

HAWKING (p 522) reports on onchocerciasis in S W Tanganyika HARRIS (p 522) writes on the clinical aspects of onchocerciasis in Kenya with special reference to skin nodules and eye conditions Treatment with intravenous antimony sodium tartrate was attempted

In America SAWITZ *et al* (p 523) found that the incidence of *Enterobius* infection was twice as high in children sleeping in large dormitories as in those in single or double rooms Eggs were found in various parts of the rooms In comment LANE refers to the possibility of air borne infection BROWN *et al* (p 523) and WELLER and SORENSON (p 524) record incidence figures from parts of the United States CRAM (p 524) gives details of *Enterobius* infection in white and negro children in Washington and KUTTUNEN EKBAUM (p 524) in children in Toronto MILLER and CHOQUETTE (p 525) found 33 per cent of children in a Quebec village to be positive for *Enterobius* eggs at one examination OSORIO and MAZZOTTI (p 525) found *Enterobius* eggs in anal swabs in 51.6 per cent. of children in Mexico City

GRAHAM (p 525) describes a modification of the NIH swab

GREENE and GREENE (p 525) report eight cases in which *Enterobius* was present in the appendix in children in seven the diagnosis was acute appendicitis but in only one was there evidence of acute inflammation Removal of the appendix cured the symptoms

MILLER *et al* (p 526) report that gentian violet in the treatment of *Enterobius* infections was effective in 90 per cent of the cases treated and that untoward effects were practically negligible In the *Journal of the American Medical Association* (p 526) is a note to the effect that Butolan produces good results in the alleviation of symptoms but that the drug of choice appears to be gentian violet.

HOLLAENDER *et al* (pp 526-527) discuss the effects of ultraviolet radiation on the eggs of *Enterobius vermicularis*

SAWYER *et al* (p 527) describe the clinical course of a case of trichiniasis

MAUSS (p 528) shows that trichinous rats transmit partial passive immunity to their young He (p 528) shows that the infectivity of larvae after exposure to immune serum is only one-third of that after the use of normal serum OLIVER-GONZÁLEZ (p 528) has studied the effect *in vitro* of immune sera on adults and larvae of *Trichinella spiralis* Precipitates form in the serum round the mouth of the larva and round the other apertures of the adult These precipitates are associated with the death of many of the larvae. MCCOY (p 529) observed a rapid elimination of *Trichinella* larvae in the faeces when.

these larvae were given by the mouth to immune rats. Increased secretion of mucus and increased peristalsis appeared to be the chief factors in producing this result.

LI YI: Incidence of Parasitic Ova and Appendicular Faecaliths.—*Chinese Med J* 1940 Nov Vol 58 No 5 pp 592-594

Seventy-two appendices collected from surgical specimens and necropsies in Kweichow over a duration of about 2 years were investigated.

Among the surgical series there were 8 containing faecaliths and 5 faecal material. Among the 21 necropsy appendices 9 contained faecal material but no faecaliths.

The total number of appendices containing either faecaliths or faecal material was 29 the contents of all of which revealed parasitic ova. The ova were chiefly ascaris eggs next in order the trichocephalus and lastly ankylostoma eggs.

WILSON BARR (Philip): Phenothiazine as an Anthelmintic in Threadworm and Roundworm Infections.—*Lancet* 1940 Dec 21 pp 485-489

Phenothiazine a thiazine dye has been shown to be effective against ascaris larvae against threadworms in sheep and against stomach worms in a crab. It is secreted in the urine and acts as a urinary antiseptic.

Three Indian larvae infected with the common threadworm were given phenothiazine in doses ranging from 30-40 c but the result was such that the drug is ineffective for worms in the small intestine. The result has been found in animals.

A patient with ascaris lumbricoides was treated. She had a total of 1000 worms with roundworms and whipworms. These seven patients were treated with phenothiazine from 16 to 43 g. Only one roundworm was found. Of the remaining two patients one had a multiple infection with roundworms hookworms whipworms and threadworms the other had roundworms hookworms and threadworms. All the roundworms been removed. Phenothiazine has given good and permanent results in the treatment of threadworm infections especially in children. Effects on six children and three adults are recorded. The following doses are advised and the adult required a second course. The following doses are advised 2 grammes daily for seven days for children under 8 and half the dose for children under 4 6 grammes daily for at least five days for adults.

Dr LEVITSKY forwarded this additional information from the London Zoo

4 young guinea pigs were infected with ankylostomum, oesophagostomum and threadworms. It was found that 3 g of phenothiazine in the three weeks from March 13-15 1941. As a result 18 oesophagostomum were passed in a day. A result 18 oesophagostomum were passed in a day. The condition with ankylostomum at the top of the small intestine was cured on May 14 and 2 threadworms were found in the intestinal canal though large numbers of ankylostomes were present and had and which caused the animal's death.

The diagnostic method used for establishing infection and its cure is not stated
Clayton Lane

DOMBROUSKY (A. L.) The Roentgen Diagnosis of Cysticercosis.—*Amer Jt Roentgenology* 1941 Apr Vol 45 No 4 pp 558-562 With 8 figs.

NICOLSON (Edward L.) A Pelvic Hydatid Cyst.—*Lancet* 1941 June 21 p 784

TOMITA (Susumu) Experiment on the Susceptibility of Humans to Infection by *Strongyloides fülleborni* and with *S. papillosus*—*Taiwan Igakkai Zasshi* (*Jt Med Assoc Formosa*) 1940 Nov Vol 39 No 11 [In Japanese pp 1884-1885 English summary p 1885]

In these experiments *S. fülleborni* did and *S. papillosus* did not infect man

The experiments were inflicted by the author on himself and with their consent on five volunteers After the infection with *S. papillosus* no eggs were passed after that with *S. fülleborni* eggs appeared in the faeces after 16 23 and 32 days The mode of infection is not mentioned in the English summary
C L

MATUDA (Sizuo) Some Abnormal Eggs of *Ascaris lumbricoides* Linnaeus—Reprinted from *Volumen Jubilar Pro Prof Sadao Yoshida* Osaka Japan 1939 Mar Vol 2 in *Collected Papers from the Faculty of Medicine Osaka Imperial University* 1939 pp 111-114 With 10 figs on 2 plates [10 refs]

The abnormalities described consist of agglomerations of fertile eggs numbers up to seven being stuck together by their outer albuminous shells of size unusually large or small of shape including buds or indentations of lack of the outer shell The usual barrel shaped unfertile egg with its coarse granular or globular contents is not mentioned. [The reference in the text to the figure of an egg lacking an albuminous covering should have been cited as Pl II fig 10]
C L

CHIKIAMCO (Paterno S) & ORQUIZA (Clodualdo T) Roentgen Diagnosis of *Ascaris* in the Gastro-Intestinal Tract.—*Acta Med Philippina* 1940 July-Sept Vol 2 No 1 pp 15-20 With 7 plates.

An X ray plate made 4 to 6 hours after an opaque meal displays an *Ascaris* as a cylindrical or coiled filling defect as a string-like shadow thrown by the opaque substance which the parasite has itself swallowed as two lines of shadow where this has clung to the worm's cuticle or as a small polyp-like defect when the worm lies in the direction of the rays In children this diagnostic measure fails it is believed because they cannot take enough of the contrast substance to cause a filling defect and can hardly follow the instructions given during radiography
C L

VON B AND (Theodor) Aerobic Fat Metabolism of *Ascaris lumbricoides* —
 Proc Soc Exper Biol & Med 1941 Mar Vol. 46. No 3
 pp 41-418

M HP Werner) & LIPPELT (Heinrich) Bericht ueber weitere Ergeb-
 nis mit der Filarien-komplementbindungsreaktion [Further
 Work on the Filaria Complement Fixation Reaction. — *Klin Woch*
 1940 Feb 17 Vol 19 No 7 pp 157-159

The antigen was made from *C. mortispriculum rhacae* a filarial nematode
 parasit in the South American ostrich. It was tested on 14
 persons all were negative for hookworm eggs and 12 were negative
 to the Wassermann test.

The reaction in two 4 persons and in two *Lox los* infections was
 lowered a — and in the third from each group it was negative
 It also showed a — in two persons who came from filaria-ridden
 countries in one old case of *H. bancrofti* infection and in three showing
 Calabar swelling. Another table shows the antigen reaction in persons
 who had no malarial infection in the blood. It was — in two with
 ankylostomiasis and in one with ankylostomiasis and infection with
Schistosoma mansoni and in one with subtertian malaria. It was —
 in one with ankylostomiasis and *S. mansoni* infection and in one
 with tertiary syphilis. It was — in one with secondary syphilis.
 In — with ankylostomiasis one with *S. mansoni* infection and 4 with
S. mansoni infection the reaction was negative.

C L

Rao, Sundar Study of Filarial Infection in Ratanpur (Central
 Provinces) — *Ind J Med Res* 1940 Oct Vol 28 No 2
 pp 609-613 With 1 map

Filaria is common in the town of Ratanpur Central Provinces
 India but almost or wholly absent in neighbouring localities.
 A house-to-house survey was made.
 The population of about 2,000. A blood survey of 191 persons
 made between 9 and 10 p.m. showed 1/3 malays in 31 (16.23 per cent).
W. bancrofti was absent from the slides. The prevalent mosquito
 species found by IVENGAR were *Mansonia (Mansonioides) annu*
l. m. m. m. *Culex tritaeniorhynchus* *C. fatigans* *Anopheles pallidus* and
A. sinensis. The *Mansonioides* breed in most of the big tanks all
 of which are overgrown with Pistia. *Culex* breed in broken pots near wells.

C L

COETJEE, D. De bevolling der Was Apo-vlaakte en de aldaar voorko-
 mende Filariasis (Eiland Boeroe) Filariasis among the inhabitants
 of the Was Apo Plain (Boeroe Island). — *Geneesk Tijdschr N*
 1940 Oct 1 Vol 80 No 40 pp 2349-2375
 With 4 figs on 1 plate 2 plans 1 map & 1 chart

Among 332 persons belonging to 23 kampongs in this district there
 were 431 whose blood examination revealed malarial infection 51.8 per
 cent 118 or 26.2 per cent of preparations made during the day were
 positive. Making up the total were 228 men of whom 143 (63.8 per
 cent) were positive 210 women 98 (49 per cent.) children over

" Films also gave negative results " but in artificial media the formation of small leucocytes from masses derived from blood could be observed. The macrophages seemed to concentrate around and within the semi-solid matrix of these masses in great numbers as if by a process of taxis. They showed a definite tendency to pass through the mass by vigorous writhing movements. During this process the loose posterior end of the sheath became attached to the mass, the sheath was ruptured and the embryo slowly appeared to wriggle out. The whole process took about a few hours to twenty-four hours before the embryo could be free.

This mechanism was found to be exactly similar to what took place in observation carried out on the mosquito stomach full with infective blood feed. The larva hatched and became fixed in the foregut and it could be seen that in about twelve to twenty-four hours after the feed exsheathement embryo had wriggled out of the cloaca and even the stomach wall.

C. L.

Kobayashi Hachiro
Organization of *U. vivax* larvae—*Tansu I Jishi Zasshi*
J. Med. Entom. 1940 Oct Vol 39 No 10 To
Japanese pp 1651-1657 25 ref English summary pp 1658-1659 With 2 plates

This special form of tanning was used —

The material used in air 2-4 hours after being haemolysed in distilled water were transferred directly into distilled Gammas solution—1 drop of dye in 100 cc of distilled water—for 4 to 60 minutes and over tanned, then washed in tap water for several minutes after which they were differentiated in methylalcohol and washed in tap water quickly.

In the adult stage there are special primordial cells for the anterior and posterior oesophagus and mid-intestine the 1st ones were situated anterior to the nerve root the 2nd situated at about the centre of the larva and the 3rd situated at the close behind the 2nd. These could possibly easily be distinguished by vital staining.

The genital anal plates at the ventral aspect near the primordial cells of the posterior oesophagus and mid-intestine at a point varying from 30-51 to 83 per cent from the head of the larva of course it has no relationship with the ocelli.

He Stephen M. H. *Culex fatigans* Theobald as a Carrier of *Wuchereria bancrofti* Cobbold.—*Tansu Sci JI* 1940 Oct 26 Vol 19 No 4 pp 543-547

1. *Culex fatigans* was found to be susceptible to experimental infection with *Wuchereria bancrofti*.

2. All the natural larvae in the *Culex fatigans* were found to be positive to the infection at the time of dissection were of the infective stage.

3. 4 *Culex fatigans* were not a common household mosquito in Shanghai it is not likely to play an important part in the transmission of *Wuchereria bancrofti* infection in this region.

Kariadi A hyrcanus *A. en filaribus* malaya to Martapoetra.
J. Med. Entom. 1941 Jan. 21 Vol 40 No 3 pp 107-118
With 3 figs 13 refs English summary

Aedes hyrcanus *A. a variety of hyrcanus* is very abundant in Martapoetra and from in the wet part of the year a real plague. *A. hyrcanus* is able to carry *Flaria Malaya*.

According to recent investigations made at Martapoera, this ability is less developed in comparison with local *Mansonella uniformis* and much less in comparison with *M. barbrostris* at Kalawara

On account of the large numbers of mosquitoes present and their anthropophily the danger must not be underestimated [See also this *Bulletin* 1940 Vol 37 p 667]

NAPIER (L Everard) DAS GUPTA (C R) & RAO (S Sundar) **Sternal Puncture in Filariasis**—*Indian Jl Med Res* 1940 Oct. Vol 28 No 2 pp 605-608

1 Sternal puncture was done in 53 cases of filariasis. In three out of 46 cases done during the daytime and in ten out of ten done at night microfilariae were found. In all instances there were more microfilariae in the peripheral blood than in the sternal puncture fluid.

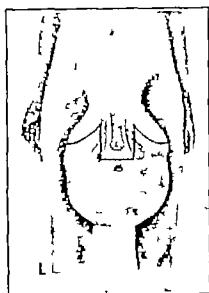
2. There is thus no evidence that microfilariae shelter in the bone-marrow during the day or that they are destroyed in the marrow.

3 The cytological analysis of the material does not suggest that there is any change in the bone marrow in this infection and in fact the nucleated-cell counts might well be taken as a normal series.

DE SAVITSCH (Eugene) **Surgical Treatment of Elephantiasis of the Scrotum and Penis.**—*Jl Urology* 1941 Feb Vol 45 No 2, pp 216-222 With 5 figs

The only satisfactory treatment is surgical and its success depends largely on the ability to mobilize sufficient healthy skin to permit construction of a new scrotum.

Spinal anaesthesia has been used partly because there are so few competent general anaesthetists in the Stanleyville district of the



Incision for elephantiasis of the scrotum.
[Reproduced from the *Journal of Urology*]

Belgian Congo. One case only of elephantiasis of the penis has been seen and skin grafting after operation is not advised for

local patients will not leave dressings alone and granulation and growth of epithelium from the wound margin gives a satisfactorily functioning organ.

For the scrotal operation the mass is tran fixed by a hook hung from the ceiling and hauled up as required. As tourniquet, the inner tube of a bicycle tyre is described as of tremendous advantage. "The size of the flap for covering the penis is determined by palpating the penis through the mass and giving a leeway of about half an inch on its borders. After tracing the flap, their detachment brings into view the underlying gelatinous tissue which the inner easily separate from the skin. The penile flap must be secured to the corium or it will slip away at the first erection. The need of precise care in securing blood vessels is repeatedly stressed. SAVITSCH does not give the number of his operation but quotes DE GREEF as having had recurrence in three only of 100 cases.

C L

STROOKER (William A.) Fleas as Acceptable Intermediate Hosts of the Dog Heartworm, *Dirofilaria immitis*—*Proc Soc Exp Biol & Med* 1940 Mar Vol 43 No 3 pp 448-450

In any further work on *Dirofilaria*, undertaken for its bearing on Bancroftian or other human filariasis these facts may prove helpful.

"The flea *Ceratophyllus* *canis* C. felis and *Pulex irritans* collected from dogs harboring *Dirofilaria immitis* have been found naturally infected with the microfilarial and larval stages of this parasite. The female fleas seemed much more susceptible to the insect than the males. All 3 species of fleas have been experimentally infected and in all 3 the extra-mammalian phase of the life cycle has been completed. The time required for this development in fleas was 120 hours in warm weather and 216 hours in cold weather. This phase of the life cycle was more rapidly achieved in fleas than in mosquitoes. It appears that both biologically and epidemiologically fleas are more suitable intermediate hosts of *Dirofilaria immitis* than had been previously supposed.

C L

HAWKING (Frank) Onchocerciasis in Tanganyika Territory—*Ann Trop Med & Parasit* 1940 Dec 31 Vol 34 Nos 3 & 4 pp 211-215

The investigation was made during May which is the end of the rainy season at places in the south-west portion of Tanganyika Territory.

There were examined 1067 persons from those with nodules or with eye troubles and from many other. In having v. r. taken from the suspected nodule or between the scapulae. Of 276 having so made microfilariae were found in eight and of these positives one had a nodule and three had eye trouble not necessarily claimed as onchocercal.

C L

HARRIS (B. P.) Clinical Aspects of Onchocerciasis in the South Kavirondo District of Kenya Colony—*J. Roy Soc Trop Med & Hyg* 1940 Nov 30 Vol 34 No 3 pp 233-248 With 2 figs (1 map) 10 refs

A clinical investigation linked with McMAHON's skin snipping (this Bulletin 1941 Vol 38 p 134 and the work of HAWKING above

In 257 persons examined the commonest signs were skin nodules present in 31.1 per cent of those in whom a single skin snap showed microfilariae and in 22.8 per cent of those in whom it did not in these two groups the percentages with abnormal skin were 23.0 and 14.1 with pain in the eyes were 16.0 and 11.4 with sight poor or with abnormal appearance of the eye 14.0 and 8.7. As usual nodule sites were related to superficial bones—ribs especially in the axillary line iliac crests anterior spines sacrum, occipital ridges behind the ears. Two in less usual sites (over the great trochanter and over the ischial tuberosity) were cut out and both showed worms. The first skin affection was an itching rash the skin thickened and either became elephantoid with enlarged lymph nodes or appeared to pass into general atrophy. Harris in considering the eye lesions disclaims a specialist's position. Mention is made of an appearance like an arcus senilis in the relatively young of corneal opacity beginning in its lower part and also of iritis keratitis and cataract. Trachoma and avitaminosis are given as possible factors in causing eye troubles. Treatment by intravenous injection of antimony sodium tartrate was given to 16 persons after a nodule if one were present had been excised. In 12 of these the microfilariae disappeared from the skin blood and the eosinophil percentage commonly dropped but the figures in the table do not suggest that these changes ran parallel. The needed lines of investigation are outlined and the Kadera Location, in which this investigation was put through is believed to be particularly suitable for such work.

C L

SAWITZ (Willi) D'ANTONI (Joseph S) RHUDE (Kenneth) & LOB (Sydney) *Studies on the Epidemiology of Oxyuriasis.*—*Southern Med J* 1940 Sept Vol. 33 No 9 pp 913-921 With 5 figs [20 refs.]

This investigation covers examination by the NIH swab in six children's homes in New Orleans of 278 white boys 87 white girls 63 coloured boys and 63 coloured girls.

The percentage incidences of these were severally 89.1 60.9 84.1 and 15.9. Infection increased with age up to 14 years and then lessened. In those of comparable age it was twice as common among those sleeping in large dormitories as in those in single or double rooms it was not lessened by care in keeping clean the house clothing or bedding it was not increased in nail biters it had no relation to expenditure on food or maintenance it is held to be passed on by direct contact. Eggs were collected not only from clothes but also from ledges of pillars windows and doors. [The likelihood of air-carriage is not considered. Regarding this the work of NOLAN and REARDON (this *Bulletin* 1939 Vol 36 p 845) merits special note and air-carriage seems to fit all the facts.]

C L

BROWN (H W) SHELDON (A J) & THURSTON (T) *The Incidence of Pinworm (*Enterobius vermicularis*) Infection in North Carolina.*—*Southern Med J* 1940 Sept. Vol. 33 No 9 pp 922-925

By a single examination with the NIH swab there were examined (1) 132 white boys at the Charlotte Observer Fresh Air Camp (2) 100 white and negro patients of all ages in an outpatient clinic at Durham North Carolina (3) 118 male students of the university of N Carolina

For these three groups the percentages of infection were respectively (1) 38.8 (2) 7.4 in 67 whites and 0 in 33 negroes (3) 0. The failure to find a single pinworm infection in 33 negroes is unusual. The negroes' habits of personal hygiene are such that we could be led to expect a high pinworm infection rate among them. C. L.

WELLS (Thomas H.) & SORENSON (Charles W.) Enterobiasis Its Incidence and Symptomatology in a Group of 505 Children.—*N. Engl. J. Med.* 1941 Jan 23 Vol 224 No 4 pp 143-146 10 refs

The children nearly equally divided between boys and girls were examined usually once only after the morning toilet by the NIH cellophane swab and 19 per cent found infected 23 in girls and 15 in boys. They had no symptoms. C. L.

CHAY E B) Studies on Oxyuriasis. XXIV Comparative Findings in the White and Negro Races.—*Proc Hel Soc Wash* 1940 Jan Vol 7 No 1 pp 31-35

The author's summary reads as follows:—
 NIH anal swab examinations for *Enterobius vermicularis* were made on children of the white and Negro races in nursery schools and summer camps. Four swabbings per child showed an incidence of 33 per cent in 209 white children and of 19.8 per cent in 131 Negroes. In children of school age 6 to 12 years old examined in camp there was only a slight difference in the incidence in the two races 25.2 per cent in white as compared with 20.6 per cent in Negroes. However this sample of white children exclusively Jewish showed a much lower rate of infection than have other comparable samples previously reported. In nursery school-children 2 to 5 years old, there was found an incidence of 51.6 per cent in whites compared to 10.1 per cent in Negroes. The findings are analyzed as regards the incidence in the two races and the relation of positive and negative findings. Whether the author states. The findings in the two sexes were almost identical or actually identical, in both races. Addition of these persons to others examined from the general population of Washington D.C. brings the total to 2,582 white persons with the finding of pinworms in 1,081 or 41.9 per cent and 789 Negroes with the finding of pinworms in 122, or 15.5 per cent.

KUJALA E. & EKKARIN (E.) Intestinal Parasites in Children in Toronto.—*Am. J. Dis. Children* 1940 Sept Vol. 60 No 3 pp 518-523

Stool samples from 438 children showed protozoa or helminths in 33.56 per cent. Apart from saline and iodine smears the methods used cannot be identified from the designations given. Among the helminthic infections so disclosed were *Diphyllobothrium latum* 1, *Taenia* 1, *Ascaris* 1, *Trichuris* 1, threadworms 16, but for the last infection the NIH swab used and repeated gave an infection percentage of 48.6 with variations between 32.1 and 73.1 in 843 children in different institutions and with the highest incidence between the ages of 6 and 14. C. L.

MILLER (Max J) & CHOQUETTE (Laurent) **Studies in Pinworm Infection in Canada. I. The Incidence of Pinworm Infection in French-Canadian School Children.**—*Canadian Med Assoc J* 1940 Nov Vol 43 No 5 pp 453-455 With 1 chart

The examinations were made with the NIH swab used once on each child between 9 a.m. and 2 p.m. It could not be found out whether some had not been bathed that day

An examination of 198 school children from six to 16 years of age in a Quebec village showed 33 per cent. to be positive for pinworms in one swab examination. Calculated on the basis of seven swabs it indicates that approximately 47 per cent. of the children are infected with pinworms.

C L

OSORIO (María Teresa) & MAZZOTTI (Luis) **Examen de niños en tres instituciones escolares para investigar la presencia de oxiuros [Investigation in 3 Schools on the Incidence of Threadworms]**—*Rev Inst Salubridad y Enfermedad Trop Mexico* 1940 Sept Vol 1 No 3 pp 265-273 With 2 figs English summary (7 lines)

Results of examinations for oxyuriasis in three school Institutions of the city of Mexico using the NIH swab are reported in this paper

From a total of 684 scholars 51.6 per cent. were found infected. The incidence found is undoubtedly lower than the real one as only one swab was taken from each individual.

GRAHAM (Clarence F) **A Device for the Diagnosis of Enterobius Infection.**—*Amer J Trop Med* 1941 Jan. Vol 21 No 1 pp 159-161 With 4 figs

A modification of Hall's NIH swab using an adhesive cellulose tape. Transparent Scotch cellulose tape is adherent on one side. A piece 8 cm. long is cut from a half inch roll about 1 cm. at each end is turned over to form ends that do not stick to the forceps that hold the strip in a loop sticky side out. This sticky surface is dabbed on the perineal skin and picks up epithelial scales faecal particles and eggs if they are present. The strip is placed face down along a microscope slide the turned up ends being cut off if they get in the way. The reproduced photographs are striking

C L

GREENE (Earle I) & GREENE (J Major) **Appendiceal Oxyuriasis**—*Amer J Surgery* 1940 May Vol 48. No 2. pp 440-443 [31 refs]

- 1 Eight cases of [children with] appendiceal oxyuriasis are presented
- 2 Seven were diagnosed as acute appendicitis
- 3 No symptom or lack of symptoms will differentiate the disease from a true acute appendicitis
- 4 Removal of the appendix cures the patient.

Free fluid in the abdominal cavity was found five times. Two appendices had bulbous tips. Two contained fecaliths. An edematous organ was reported twice.

Three organs were diagnosed as acute appendicitis by the operating surgeon. One was called an obstructive appendicitis another a chronic interval appendix. The others were considered as subacute specimens.

Only one of the cases was reported as having any evidence of acute inflammation. All others were reported as containing the oxyuris

"After the worms were discovered, the stools of four patients were examined. The worm was isolated once. Eggs were found in one instance whereas in the other two the stools were negative."

The high incidence of *Enterobius* infection in children in the U.S.A. newly displayed by the use of Hall's NIH swab will surely foster examinations to determine whether the acute condition is commoner in those with or without infection. If in those with the need to detect and remove infection is great. C. L.

MILLER (Max J.) (MOQUETTE (Laurent) AUDET (Wilfred) KELSO (P. F.) & GUENETTE (J. A.) Studies on Pinworm Infection. II. Tests with Gentian Violet in the Treatment of Pinworm Infection.—*Canadian Med Assoc J* 1940 Nov Vol. 43 No 5 pp 455-458

Gentian violet in tablet form was tested against pinworm infection in 29 school children ranging from 6 to 13 years of age inclusive. The drug was administered over a period of 10 consecutive days: the children 6 to 9 years of age inclusive getting two 320th grain tablets, three times a day, and those 10 to 13 years of age inclusive getting one $\frac{1}{2}$ grain tablet three times a day. The drug was found to be efficient in approximately 90 per cent of the cases treated as determined by three post-treatment examination made by the NIH anal swab technique.

Untoward effects of the drug were practically negligible. Vomiting occurred in two children, one of whom was in error given more than the prescribed dosage and the other a child of 5 who was given three 320th grain tablets daily for nine days. Both children were under weight with poor appetites and it is suggested that the treatment of such cases be extended over a longer period, short treatment period being followed by treatment free periods of equal length.

The history of 41 persons infected with pinworm showed the more common symptoms of pinworm infections to be nervousness, restlessness, sleep, pruritus of the anal region, and nocturia.

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 1940, Nov 30, Vol 115 No 22 p 1809—Butolan for Pinworms. [Queries and Minor Notes]

The query concerned with possible contraindications to the use of Butolan in *E. vermicularis* infections. In reply it is stated that no contraindications have been noted. Good results have been recorded with the drug but these were probably based on the alleviation of symptoms rather than on the evidence of anal swabs. At present the drug of choice appears to be gentian violet given by the mouth. See this Bulletin 1940 Vol 37 p 649. C. IF

HOLLANDER (Alexander) JONES (Marna F.) & JACOBS (Leon). The Effects of Monochromatic Ultraviolet Radiation on Eggs of the Nematode *Enterobius vermicularis*. I. Quantitative Response.—*Jl Parasitology* 1940 Oct Vol 28 No 5 pp 421-432. With 4 figs. 19 refs.

Ultraviolet radiation lessened the survival prospects of *Enterobius* eggs.

"The egg shell consists of three different layers. The outermost layer is protein, the middle layer chitin, and the innermost layer

lipoids The inhibition of hatching by ultraviolet radiation could be produced first by a hardening of the outside protein layer second, by a change in the composition of the lipoid membrane third by irradiation injuring the embryo within the shell and fourth, by possible toxic substances formed in the egg by this radiation. The production of toxic substances seems the least likely explanation with the energy values used in these experiments. It would seem from the evidence of the shape of the killing curves that death is probably caused by a combination of several factors and not a single effect produced by irradiation.

[Chitin of insects is insoluble in caustic alkalis but chitin of helminths is readily soluble in them. The use of the term chitinoid for the latter will prevent confusion] C L

JONES (Myrna F) JACOBS (Leon) & HOLLAENDER (Alexander)
The Effects of Monochromatic Ultraviolet Radiation on Eggs of the Nematode, *Enterobius vermicularis* II Sublethal Effects.—
Jl Parasitology 1940 Dec Vol 26 No 6 pp 435-445
 With 3 figs. [14 refs]

1 The rate of hatch is slower for eggs irradiated with monochromatic ultraviolet radiation given considerable energy than for controls

2 A delayed lethal effect of ultraviolet radiation is indicated since eggs stored after having been irradiated with a considerable amount of energy showed a smaller percentage hatch than others of the same batch which were tested immediately

3 Many larvae which hatched from irradiated eggs survived for a shorter time than those hatching from eggs in control dishes

4 Ultraviolet radiation is more damaging to immature eggs than to those which have attained the ring-and-a-half or infective stage

SAWYER (Kenneth C) LIGGETT (R S) & DAY (Hughes W)
Trichinosis from a Clinical Standpoint.—*Rocky Mountain Med Jl*
 1940 Dec Vol. 37 No 12. pp 984-986 With 3 figs

We present the following case of trichinosis because of its unusual clinical picture and to illustrate the point that we may be missing many atypical cases of this disease

An Italian woman of 25 came to hospital complaining of weakness and swelling of the eyelids she had high fever with rigor and eosinophils were 6 per cent. On questioning her next morning the eating of fresh pork was admitted but she insisted that it had been well cooked. the eosinophils were then recorded at 12 per cent. Later on she admitted to eating raw sausage a fortnight before her illness began and some of this was obtained and shown to contain many *Trichinella* cysts. On the 7th day after admission to hospital violent purging demonstrated many trichina worms in her stools the microphotograph indicating that adults were in mind. A positive skin test was present on the fifth day and a blood precipitin test drawn on the tenth day of the patient's illness was negative in all dilutions. Blood drawn 3 weeks later gave a positive report in dilutions of 1 1280

C L

MAUSS (Evelyn Abrams) Transmission of Immunity to *Trichinella spiralis* from Infected Animals to their Offspring.—*Am J Hyg* 1940 Sept Vol 32, No 2 Sect D pp 73-79

In the offspring of trichinous rats, rabbits, and hamsters the percentage development of infecting doses of trichina larvae was lower than in the offspring of uninfected animals. This lowered susceptibility to infection was lost by the hamsters as early as the third week after birth. The time before parturition of infection of the mother hamsters did not appear to influence the degree of immunity transmitted to the young. Examination for trichinae after complete digestion of the musculature of five rats, five rabbits, and 24 hamsters, all offspring of infected mothers, revealed not one case of prenatal infection, eliminating actively acquired immunity as a possible cause for the partial immunity demonstrated to exist in these animals.

MAUSS (Evelyn Abrams) The In Vitro Effect of Immune Serum upon *Trichinella spiralis* Larvae.—*Am J Hyg* 1940 Sept Vol 32, No 2 Sect D pp 80-83

Trichinella spiralis larvae which have been incubated at 37°C for 18 hours in 43 per cent homologous immune serum are only 30 per cent as infective as larvae which have been incubated under the same conditions in 43 per cent normal serum. There is a similar reduction in infectivity of larvae exposed to 0.9 saline solution, but the reduction becomes statistically insignificant when 10 per cent normal rabbit serum is added to the saline.

OLIVER-GONZÁLEZ (Jové) The In vitro Action of Immune Serum on the Larvae and Adults of *Trichinella spiralis*.—*J Infect Dis* 1940 Nov-Dec Vol 67, No 3 pp 292-300 With 8 figs. 16 refs.

The immune sera used in these tests came from rats, guinea-pigs and rabbits. They were of two sorts—the first from animals that had had by mouth a single dose of infective larvae 8 to 10 weeks earlier, conveniently labelled immune serum, the second from others that had been given small and gradually increasing feeds of trichinous meat (BACHMAN & GONZÁLEZ see this *Bulletin* 1937 Vol. 34 p 459) and obtained 3 to 4 weeks after the last feed, which was usually next day serum. The adult worms were got by flushing with normal saline the unopened gut of rats infected 4 to 7 days earlier. The infective larvae by digesting rat muscle in pepsin and hydrochloric acid, the freed parasites were then washed in 1 in 20 000 solution of mercuric chloride and larvae for at least the adults for at most 30 minutes. The t were made by placing in a hollow slide about 5 parasites in a mixture of one drop of normal saline and four drops of serum.

The action of specific immune and hyperimmune serums from rats, guinea-pigs and rabbits was tested in vitro on larvae and adults of *Trichinella spiralis*. In all of the immune and hyperimmune serums precipitates formed in large masses around the mouth (the larvae and was associated with immobilization, disintegration and death of many of the larvae. In addition to the oral precipitate anal and vulval precipitates were formed around the adults. The vulval precipitates seemed to obliterate the opening and may be the mechanism whereby the escape of the embryo is prevented in immune serums.

The time at which precipitates appeared varied according to the degree of immunization. In the serum from the hyper immune animals precipitates appeared earlier and were denser than in the serum from immune animals. Inactivated serum was as effective as unheated or complemented serum.

No precipitates were formed around the larvae or adult worms when placed in normal or in anti-*Cysticercus crassicolis* serum.

Serum from rabbits immunized with saline suspensions of powdered larvae apparently caused the death of over 50 per cent. of the larvae but had little or no effect on the adults.

Emphasis is laid upon the probable role of specific antibodies in acquired immunity to *Trichinella spiralis*.

C L

McCoy (O R.) Rapid Loss of *Trichinella* Larvae fed to Immune Rats and its Bearing on the Mechanism of Immunity—*Amer J Hyg* 1940 Nov Vol 32 No 3 Sect. D pp 105-116
With 2 figs [11 refs]

Rats were made resistant to further infection with *Trichinella spiralis* by feeding them three or more sublethal doses of *Trichinella* larvae over a period of several months. When test doses of larvae were fed to these rats the larvae were rapidly lost from the intestine considerable numbers appearing in the feces as soon as 3 hours after feeding. Most of the immunized rats developed diarrhea within a few hours and after 8 to 18 hours had eliminated the majority of the larvae fed. The larvae passed in the feces were alive and developed normally when fed to normal rats. No evidence of an abnormal cellular reaction was observed in the intestinal wall of immunized rats killed at intervals after feeding the test dose of larvae. The increased secretion of mucus and increased intestinal peristalsis appeared to be the chief factors that operated to expell the larvae from the intestines of resistant rats.

MISCELLANEOUS

MANSON BARR (Philip) The Prevalent Diseases of Italian East Africa—*Lancet* 1941 May 10 pp 609-612. With 1 fig
[61 refs]

Thus the second paper on the diseases prevalent in the Italian African Empire is as valuable as the first which was reviewed in this *Bulletin* 1941 Vol 33 p 415. It will be of great service to the British medical staffs to whom will fall the duty of supervising the health of European and natives in East Africa.

The diseases dealt with are malaria largely due to *Plasmodium falciparum* carried by *Anopheles gambiae* leishmaniasis relapsing fever yellow fever typhus of which the louse-borne type is the most frequent plague and the dysenteries. Of general diseases pneumonia cerebrospinal fever tropical ulcer rabies and smallpox are common venereal diseases are widespread and helminthic infestations of which *Taenia saginata* infection is the chief are widely seen. There are foci of bilharzia. The common snakes are referred to. The sections on these diseases are so full of facts that they cannot be abstracted. The information given is accurate and is up to date.

In the final paragraph is a comment on the information available from Italian sources. It is shown that the reports issued by the

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military authorities concerning the health experiences during the war of 1835-38 conflict strongly with those subsequently published by Italian medical men, and present perhaps too rosy a picture of general health during military operations.

WESTERN SAVOA, MANDATED TERRITORY OF TWENTIETH REPORT
OF THE GOVERNMENT OF NEW ZEALAND BY THE ADMINISTRATION
FOR THE YEAR ENDED 31ST MARCH, 1940 PP 10-13—
Health.

The complete health staff comprises 19 Europeans 137 Samoans and one Chinese dresser there are 3 European medical officers 14 native medical practitioners one dental officer one dispenser and a bacteriologist all Europeans a matron 8 European sisters and 7 native nurses including some undergoing training. During the year 18 probationers began their training. Two Samoan students finished their four years course at the Central Medical School Savu. The Native Medical Practitioners (N.M.P.s) now number fourteen. There are 9 students in Suva and 6 cadets at Apia Hospital undergoing preparatory training.

Admission to hospitals numbered 2475 (2,211 in 1939) and out patients 30,735 (24,417). Yaws is common and enteric fever occurs periodically. There was a small outbreak (number of population or cases not stated) in the village of Iva Savaii but it was soon brought under control and contacts inoculated. Five lepers were admitted to hospital during the year members of the families of lepers are examined very year for detection of early cases. Pulmonary tuberculosis mostly limited to Apia and the western environs. Samoans are low in realizing its infectiveness. Malignant jaundice occurs and fits the description there is little doubt that it is of leptospiral origin though the strain has not yet been determined.

Six natives are undergoing training as dentists. The period of tuition is three years and is followed by two years in the dental clinic. Infant mortality is given as 83.58 per mille an increase of 9.77 on the figure for the preceding year but says the report returns whilst improving in reliability do not display a high degree of accuracy.

SHUTE (P. G.) A Species of Mosquito Infesting Deep Shelters in
London.—*Lancet* 1941 Jan 4 pp 8-7
H H S

Since the underground railway stations in London have been used as air raid shelters many people taking refuge there have complained of being bitten by mosquitoes. Investigation has shown that the species of mosquito concerned is *Culex molestus* and that it breeds throughout the year 100 feet below ground level. Breeding places are numerous usually in the excavations below the lines and under platforms. In most cases the water is only a few inches deep but it is often 100 yards in length. Larvae were as numerous as in stagnant pools above ground during the summer. There was no artificial or natural lighting of these breeding places. In many parts of this underground system the temperature exceeds 70°F when it is freezing above ground. Extermination of the pest should be easy if all the breeding places can be treated with cresol or paraffin.

Norman H Aile

PATTERSON (T. C.) **Insect Pests in Northern Norway The Mosquito Nuisance.**—*Jl Roy Nav Med Serv* 1940 Oct. Vol 26 No 4 pp 346-352

In the far north in the warmest months of the year mosquitoes may be more abundant and cause more discomfort than anywhere in the tropics. In Northern Norway the seasonal peak of activity of the mosquito pest is in July. Physical and mental annoyance pain and severe inflammatory lesions may be produced by mosquito bites. Mosquitoes in these regions do not usually fly about and bite at temperatures below 50°F or above 70°F. Blood sucking propensities are said to be common to both female and male mosquitoes. The species of mosquito encountered were *Aedes punctor* *Aedes communis* 4 *maculipennis* and various *Theobaldia*. Other than the mosquito the insect pests of Scandinavia include *Tabanus* *Chrysops* *Culicoides* and *Simulium*.

The author describes the measures to be taken to protect personnel exposed to attack by these voracious mosquitoes of the far north. Formulae are given for repellents that have been found useful these mostly contain citronella oil. Special clothing head nets and gauntlet gloves are recommended as are of course measures to prevent the ingress of mosquitoes to living quarters. N W

ROY (D. N.) & GHOSH (S. M.) **On the Results of Forceful Feeding of Mosquitoes.**—*Jl Malaria Inst of India* 1940 Sept Vol. 3 Nos 2 & 3 pp 253-262. [12 refs]

(i) When mosquitoes were fed forcibly by the capillary tube method inconsistent results were obtained the food being found either in the stomach or in the oesophageal diverticula.

(ii) Evidence of volitional control exercised by a mosquito over the choice of its food was noticed.

(iii) When a mosquito is allowed to imbibe fluid food from wet cotton wool the destination to which the food is directed is extremely consistent blood being invariably found in the stomach and water and sugary solutions in the diverticula.

(iv) Blood ingested by a female mosquito by a bite is always detected first in the stomach.

(v) When a mosquito is fed artificially with blood egg formation takes place in *Aed aegypti* but not in *C fatigans* and it is suggested that the quantity of blood available for egg formation in *C fatigans* falls short of the required minimum.

MCCAY (Frank) & WHITE (R. Senior) **Biological Control of Culicine Mosquitoes by Prawns in a Bengal Coal Mine.**—*Indian Med Gaz* 1941 Jan Vol 76 No 1 pp 37-38

In a coal mine in India culicine mosquitoes were found to be breeding prolifically in pools near the coal face at a depth of about 1000 feet. The mosquitoes had probably been introduced through the ventilation system and the conditions of temperature and humidity were favourable for breeding and there was a plentiful supply of human blood. It was noticed however that certain pools contained prawns identified as *Palaemon lamarrei* and that in these pools the mosquito larvae were not so plentiful as in pools free from prawns.

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It was found that the prawns were capable of devouring three *Culex fatigans* larvae each per diem and it was later found that those parts of the mine in which prawns were present had been cleared of mosquitoes. The consumption rate for larvae of these prawns is poor compared with that of Gambusia but fish would probably not live under mine conditions. No anopheline larvae have been found in the mines. The prawns are probably introduced into the mines in sand used for stowing. They appear to afford a hopeful method of mosquito prevention and may even be useful in surface waters containing anopheline larvae but this remains to be tried.

C. H.

VARGAS LIMA. Clave para identificar algunos géneros de mosquitos americanos, utilizando los caracteres de los adultos. Key to the Adult Characters of American Mosquitoes. — *Rev Inst de Sanidad y Epidemiol T op Mexico* 1940 May Vol 1 No 2 pp 199-199. 10 ref. English summary (lines).

LARI (Oxido). Anofelinos do Vale do Paraíba. Nota III. Biologia do *Anof. (Anopheles) tridors* Root 1926 com a descrição duma aridade no *Anof. (Anopheles) tridors* e de *tridors* var. Biology of *A. tridors* with a Description of a New Variety. — *Ana Per J Med Camp* 1940 Dec Vol 40 No 6 pp 499-505. With 1 fig. 11 etc.

STRICKLAND (D. R.) & (D. N.) Experimental Intestinal Myiasis. — *Indian J Med R* 1940 (Oct Vol 28 No 2) pp 583-594.

In 1838 O. R. CALLES reported that as a result of experimental administration of larvae of *Lucilia sericata* *Phormia regina* *Calliphora vicina* *Stomoxys calcitrans* *Cochliomyia macellaria* and *Drosophila melanogaster* to dogs and cats no larvae passed alive through the intestine. This Bull. n 1839 Vol 38 p 505. The authors having acquaintance of Calles' work, report on similar experiments of their own carried out in 1931. Five-stage larvae of *Musca vicina* were administered in large number to a rabbit. Its health was unaffected and daily examinations of the faeces revealed no larvae. Next a dog was fed with a very large number of first and second-stage larvae of *Stomoxys calcitrans* (mixed with the food). For two days it refused food and passed liquid motions mixed with blood. The animal did not recover fully for a week, but at no time were larvae found in the stools. In a third experiment very many first and second-stage larvae of *Chrysomya megacephala* were introduced with milk into the stomach of a pup. It passed watery stools mixed with blood showed some wasting and died on the ninth day. At autopsy three intact adult *C. megacephala* were seen floating in a watery mucous substance in the stomach but no empty pupal case or larva was seen in the alimentary canal. Lastly eggs of *C. megacephala* three hours after oviposition were given to a rabbit and to a dog but they could not be detected in the faeces. In short the aetiology of intestinal myiasis is still unsolved.

ROY (D. N.) & GANGULI (S. K.) Linguatulid Infection in Man. — *Indian Med Gaz* 1940 Aug Vol 75 No 8, p 478. With 1 fig. This is believed to be the first record of linguatulid infection in man in the East.

H. H. S.

The parasites were evacuated with coughing and sneezing by a woman whose chief symptom for some time had been pain over the frontal sinuses. She collected in all five specimens averaging 4.8 mm. long by 1.8 mm. at the widest point. In the text 91 rows of spines are cited only 32 can be traced on the figure. They were identified as nymphs of *Linguatula serrata* Frölich. The woman had had close association with dogs the normal definitive hosts. Clayton Lane

BÜCHERL (Wolfgang) Os Chilopodos do Brasil. [The Chilopoda of Brazil.]—*Mem Inst Butantan* 1939 Vol. 13 pp 49-362 With 72 figs

WENRICH (D. H.) The Morphology of Some Protozoan Parasites in Relation to Microtechnique.—*Jl Parasitology* 1941 Feb Vol. 27 No 1 pp 1-28 With 99 figs on 4 plates [29 refs.]

The author discusses the various techniques which he has employed during the past twenty years in the study of protozoa, chiefly the human intestinal parasites. Experience has led him to modify many of the standard procedures which are carefully described. He deplors the growing tendency to dispense with the examination of fixed and stained smears in making surveys of intestinal protozoal infections for he has found that the examination of such preparations will give a larger percentage of positives than will the study of fresh smears in saline or iodine solutions. The paper is one which may well be studied carefully by those who undertake examinations for intestinal protozoa. C. M. Wenyon

SABIN (Albert B.) Toxoplasmic Encephalitis in Children.—*Jl Amer Med Assoc* 1941 Mar 1 Vol. 116 No 9 pp 801-807 With 8 figs. [20 refs.]

The paper gives a detailed description of two cases of atypical encephalitis in boys six and eight years of age in Cincinnati U.S.A. One case terminated fatally thirty days after the onset and the other recovered after an illness of ten days duration. Post mortem examination of the first case showed that the condition was a toxoplasmosis the parasites being discovered in the brain and inoculated to mice. There was evidence that the second case was of the same nature for two guineapigs became infected after inoculation of spinal fluid.

C. M. H.

PINKERTON (Henry) & HENDERSON (Richard G.) Adult Toxoplasmosis: A Previously Unrecognized Disease Entity Simulating the Typhus-Spotted Fever Group.—*Jl Amer Med Assoc* 1941 Mar 1 Vol. 116 No 9 pp 807-814 With 5 figs [15 refs.]

The authors describe two fatal cases in adults of an acute febrile exanthematic disease occurring in St. Louis U.S.A. The presence of toxoplasma in the tissues of both the cases left no doubt that these organisms were responsible for the condition which in many respects both clinically and pathologically resembled Rocky Mountain spotted fever. Guinea-pigs and mice were readily infected by inoculation of blood or autopsy material. The observations recorded introduce a new factor of uncertainty in the differential diagnosis of acute exanthematic diseases of the typhus-spotted fever group.

C. M. H.

WILSON (Fruma) **Organisms described as Avian Toxoplasma** —
 1940 Nov Vol 32 No 3 Sect. C.
 pp 88-99 With 4 figs. 49 refs

In discussing the parasites of birds which have been described as toxoplasmas the author reviews the literature of the subject and points out that he himself has found in canaries parasites of three types, all of which appear to have been considered by observer as toxoplasmas. The first of these consist of stages in the erythrocytic development of malarial parasites, the second is a parasite of undetermined nature within leucocytes and the third a true toxoplasma resembling the toxoplasma of mammal which are highly nonspecific and easily inoculate to a number of avian and mammalian hosts. The parasites of the second type cannot be inoculated to any host—not even to one of the same species—and their method of reproduction is unknown. The various parasites described in the paper are illustrated by outline drawings.

NEERVI Pablo **Estudio micológico del primer caso sud-americano de Histoplasmosis** **Mycological Study of the First South American Case of Histoplasmosis.** —Rev Inst Bacteriol
 Buenos Aires 1940 June Vol 9 No 3 pp 239-294
 With 13 figs. 29 ref English summary

WILSON in Buenos Aires the author has isolated in culture *H. capsulatum* from a patient who died three months later. The first case of the disease to be described from S America. The cultural third from which cultures were obtained. The cultural of the fungus are described in detail. These vary considerably to the media used. Microscopically filamentous in chlamydospores, proteriform cell budding by one of many uniform filament and typical blastospores are seen. Under addition the cultures are yeast-like but these quickly change to a hyphae growth. Laboratory animals are susceptible to the same culture material.

JIV **Chaili & Hopkins (Joe) Bagassiiosis a Fungus Disease of the Lung A Case Report.** —La Orleans Med & Surg J
 1941 May Vol 83 No 11 pp 590-591 Summary
 appear also in Bulletin of Hygiene

A negro labourer 20 years of age was admitted to hospital with fever, malaise, cough and dyspnoea of 12 days duration. He worked in a near factory at the dusty occupation of unloading bagasse (bagasse or bagasse—cane trash). Masks were used but did not keep out the dust. Symptoms suggested miliary tuberculosis but no acid fast bacilli could be found. The Widal reaction was negative to 1:1000 and 1:1000 but became normal after 13 days. A nodular fever malaræmia and the enteric group grew a fungus between 103.2 and 100.1 but became normal after 13 days. A culture was attempted with the sputum and there grew a fungus and again in 13 days. Later the same growth was obtained. Unfortunately the author gave no indication as to the identification of this fungus.

H H S

MOORE (MORRIS) The Chorio-Allantoic Membrane of the Developing Chick as a Medium for the Cultivation and Histopathologic Study of Pathogenic Fungi—*Amer J Path* 1941 Jan Vol. 17 No 1 pp 103-120 With 29 figs on 3 plates [10 refs]

The chorio-allantoic membrane of the developing chick has been used for the cultivation and study of viruses rickettsiae and spirochaetes but not to any extent at least for fungi.

For the work described by the author the method employed for virus cultivation was followed the coverslip procedure in preference to the shell flap method. Since fungi develop slowly it was found advisable to use eggs incubated according to the type of organism for 10 to 14 days. Yeast like organisms were observed to develop in 5-7 days filamentous forms took rather longer 5-11 days and for them eggs incubated for the shorter period of 10 days had to be used. The optimum temperature for incubation was 33°C. The eggs were examined daily and when growth was sufficiently advanced the shell was cut just below the surface of the chorio-allantois and removed. Zenker's fixative with 5 per cent. glacial acetic acid was dropped on the inoculated area to harden the membrane which was then removed and placed in Zenker's solution then embedded in paraffin sectioned and stained in the usual way.

The author thus cultivated and studied some 15 fungi among them those of *tinea versicolor* trichophytosis *tinea cruris* favus moniliasis blastomycosis *Coccidioides immitis* and *Phialophora verrucosa* (chromomycosis). The general principle has been stated above and there is no need to detail the characters of all those dealt with by the author but one or two of special interest to readers of the *Bulletin* call for more remarks.

1 *Epidermophyton inguinale* (*tinea cruris*) Eggs of 13 days incubation were used and observed for the next 8 days after inoculation. Macroscopically the membrane was thickened and showed a confluent growth with aerial mycelium. The embryos were dead. Microscopically the lesion was that of a traumatic ulcer with destruction of ectoderm and replacement with mesodermal inflammatory tissue. The mesoderm was markedly oedematous with cellular proliferation and migration and many fibroblasts. The fungus growth consisted of spherical cells staining with eosin and, scattered among these were many leucocytes monocytes and red corpuscles. Towards the periphery the spherical cells were fewer and filaments more numerous staining with methylene blue and eosin.

2 *Coccidioides immitis* For this eggs incubated for 13 days were used as for the last. At the end of seven days the membrane was greyish yellow with thickening in patches which in places were confluent. The embryos in this case were not killed. Microscopically the ectoderm in some parts was necrosed and invaded by leucocytes, the mesoderm showed focal leucocyte invasion and scattered leucocytes throughout the endoderm was not apparently affected. The organism showed various stages of development with characteristic endosporulating cells of the parasitic stage the filaments becoming arthrospores then spherical cells which grew and developed endospores. Thus in seven days the fungus had reverted to the parasitic rôle—a much shorter period than is usual in animals.

To epitomize Macroscopically the lesions showed as white greyish yellow or light brown plaques discrete or confluent according to the

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type of fungus. Microscopically the reaction might be in the form of nodules, or ulcers, or hyperplasia with infiltration of ectodermal cells, red corpuscles, fibroblasts and leucocytes and inflammatory changes with oedema. In most cases the fungus reverted to the parasitic morphology in 5 to 11 days.

By this method it has been possible "says the author" to develop lesions, some of which have hitherto required human subjects. The value of the chromaffin test for this purpose may be emphasized also because the cost is much less than if experimental laboratory animals are used and the time necessary for the development of diagnostic features frequently only a shorter.

H. H. S.

Ford (Edward) A Destructive Skin Disease of the Face in Natives of Papua and North Australia. *Med J Australia* 1940 Dec. 21
2nd Ser. Vol. 2 No. 23 pp 688-689 With 1 fig

Since the amount of a peculiar affection of the skin of the face in Natives of Papua in 1915 this *Bulletin* 1915 Vol. 8 p 132? we can find no further reference to it till this record by Dr Ford. Now forehead, cheeks and upper lip may be affected, but extension here and there is not observed.

The active lesions consist of pustules containing sebaceous material which has to form a firm grey core. In some of these healing results in the formation of scarred rounded pits, some of the more recent of which are surrounded by brown skin surface. In the majority of patients seen although in some they closely covered the nose. In the latter this nose was much enlarged and presented a peculiarly ragged appearance from the presence both of raised active lesions and of interspersed scarred depressions.

In an advanced case the affected area is closely pitted, and the surface acquires a given appearance from the presence of generalized scar tissue. The closely set depressions are often separated by hard irregular ridges, which give the region a notably ragged character.

The destruction associated with the condition is due to the long continued superimposition of fresh lesions on the affected area, each recurring crop leading to great disfigurement which is most obvious about the tip of the nose and the margins of the ears. The latter in advanced cases are often deeply and irregularly indented, as though nibbled away from the free border.

The disease parades a chronic course over many years, and finally heals point by point.

The disease has been seen not only in Papua but also in the D'Entrecasteaux group of islands, in Balbura and Melville islands, some 50 miles north of Darwin. In the D'Entrecasteaux islands about one case was seen in every thousand natives examined in the neighbouring Trobriand Islands, none among 5400 examined. It is known locally to be known. Bernal reported instances in which the virus and soft palate, boxed in alveolus but the author has not seen any such. Graphioidococcus was grown from 4 patients, also in three others in one. Unfortunately no material was obtainable for histological examination. Leishmania spp. which should be looked for.

H. H. S.

MEINARDI FLAUMENHAFT (T) *Ecthyma gangraenosum s. eschechiorum s. terebrans.*—*Geneesk Tijdschr v Nederl Indië* 1940 Oct 1 Vol 80 No 40 pp 2348-2349 With 3 figs on 1 plate English summary (3 lines)

This condition rare though it is says the author has been observed by him in four patients during 1940 Three were children aged 8 11 and 18 months and one a woman of 26 years One child recovered the other two and the woman died The patients were not related Description of one may serve for all The child aged 11 months was anaemic and poorly nourished. On the flexor surfaces of both arms from elbow to wrist was an ulcerous condition with a greenish diphtheroid base with considerable loss of tissue At the edge were unpigmented scars On the trunk extending from one nipple to the other was a deep ulcerous patch some 4 cm broad parallel with the arch of the ribs covered with a dry greenish necrotic mass Between the umbilicus and the lowest ribs was an ulcer the size of a rijkdaalder with a sanguineo-purulent base and haemorrhagic border Culture grew only *Staph Aureus* The condition of this child is well shown in a photograph

[Naturally the diagnosis has to be made from congenital syphilitic ecthyma in the children but the Wassermann reaction was not carried out with their sera that of the woman was strongly positive but she died in spite of having received antisyphilitic treatment.]

H H S

MARTIN (J T) & HESTER (K H C) *Dermatitis caused by Insecticidal Pyrethrum Flowers (Chrysanthemum cinerariifolium)*—Reprinted from *Brit Jl Dermat & Syph* 1941 May Vol. 53 pp 127-142 [12 refs.]

The authors have made an experimental study of the dermatitis which is caused by the flowers of *Pyrethrum* an insecticidal plant. They conclude that the essential insecticidal substances the pyrethrins are not responsible for the irritation, some or all of which is produced by a volatile oil.

Products containing extract of *Pyrethrum* are widely used as domestic insecticides and occasionally in the treatment of scabies. In general they are inoffensive to man but individuals occasionally become highly sensitized and then suffer from dermatitis and general allergic symptoms This sensitization is particularly troublesome among those who grow the plant as a crop for instance in Kenya. It is not known which of the numerous substances present in extracts is responsible for the symptoms The question is important in view of the great value of pyrethrum extracts as insecticides

One of the present authors is a chemist who has become sensitive in the course of about ten years work on *Pyrethrum* he allowed himself to be made the subject of the experiments here described. The general method used has been to test parts of powdered flowers and fractions of extract, which are applied to a piece of flannel strapped to the skin twenty four hours later the subject is examined for evidence of reaction The authors find that the pollen of *Pyrethrum* only produces a slight erythema this is an interesting result, for it has been held that pollen is one of the principal sources of irritation and that its carriage by wind explains the fact that sensitive people

type of fungus. Microscopically the reaction might be in the form of nodules, or ulcers, or hyperplasia, with infiltration of ectodermal cells, red corpuscles, fibroblasts and leucocytes and inflammatory changes with oedema. In most cases the fungus reverted to the parasitic morphology in 5 to 11 days.

By this method it has been possible, says the author, to develop lesions, some of which have hitherto required human subjects. The value of the chorio-allantoin for this purpose may be emphasized also because the cost is much less than if experimental laboratory animals are used and the time necessary for the development of diagnostic features frequently much shorter.

H. H. S.

FORD (Edward). A Destructive Skin Disease of the Face in Natives of Papua and North Australia.—*Med. J. Australia* 1940 Dec. 21 27th Year Vol. 2 No. 25 pp. 668-669 With 1 fig.

SINCE BRENIEL a variant of a peculiar affection of the skin of the face in inhabitants of Papua in 1915 (this *Bulletin* 1915 Vol. 6 p. 132) we can find no further reference to it till this record by Dr Ford. Nose, forehead, cheeks and upper lip may be affected but extension beyond these parts is not observed.

The lesions consist of pustules containing sebaceous material which has led to form a firm grey core. In some of these healing results in the formation of scarred rounded pits, some of the more recent of which display a reddish pink base which is readily noticeable by contrast with the surrounding brown skin surface. In the majority of patients seen only a few pustules existed at the one time among the healed lesions, although in some they closely covered the nose. In the latter the nose was much enlarged and presented a peculiarly ragged appearance from the presence both of raised active lesions and of interspersed scarred depressions.

In an advanced case the affected area is closely pitted, and the surface acquires a gloved appearance from the presence of generalized scar tissue. The closely set depressions are often separated by hard, irregular ridges, which give to the region a finely ragged character.

The destruction associated with the condition is due to the long continued superimposition of fresh lesions on the affected area, each recurring crop working the surface more deeply. This irregular erosion leads to great disfigurement which is most obvious about the tip of the nose and the margins of the *alae nasi*. The latter in advanced cases, are often deeply and irregularly indented, as though nibbled away from the free border.

The disease pursues a chronic course over many years and finally heals spontaneously.

The disease has been seen not only in Papua but also in the D'Entrecasteaux group of islands in Bathurst and Melville island, some 50 miles north of Darwin. In the D'Entrecasteaux islands about one case was seen in every thousand natives examined; in the neighbouring Trobriand Islands, none among 5400 examined. It is known locally as *tala tala*. Owing to the disfigurement, it is thought by the natives to be leprosy. Breinl reported instances in which the uvula and soft palate showed involvement, but the author has not seen any such. Staphylococcus was grown from 4 patients, *albus* in three *aureus* in one. Unfortunately no material was obtainable for histological examination. Leishmania, spirochaetes spirilla, and *Mycobacterium* are among the organisms which should be looked for.

H. H. S.

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One of the present authors is a chemist who has become sensitive in the course of about ten years work on *Pyrethrum* he allowed himself to be made the subject of the experiments here described. The general method used has been to test parts of powdered flowers and fractions of extract, which are applied to a piece of flanne strapped to the skin twenty-four hours later the subject is examined for evidence of reaction. The authors find that the pollen of *Pyrethrum* only produces a slight erythema this is an interesting result, for it has been held that pollen is one of the principal sources of irritation and that its carriage by wind explains the fact that sensitive people

are affected when they are some distance from growing plants. Further experiments showed that the irritating material resides in the lower portion of the flower head.

The investigators then made extracts and fractionated them in various ways. They were able to show that the pyrethrins (which are the active insecticidal agents) are not responsible for the dermatitis even if concentrated solutions are used. This is important, for it means that one should be able to prepare extracts which are active against insects and innocuous to man. After other constituents had been ruled out it was found that the volatile oil free from acids caused a very intense reaction on the patient: the possibility that other irritating constituents exist in the plants was not altogether excluded.

During the course of the experiments an undue number of patch tests were carried out on one day. Several of the patches became exceedingly irritating and then the experimenter's face smarted and became puffy. This was followed by persistent faintness and shivering and necessitated his going to bed. Recovery was not complete until three days later. Apart from this observation it may be said that the authors tended to confine their attention to the local dermatitis on that subject they have added greatly to what is known.

P. A. BURTON

FREUND (R.) & SAMUELSON (S.) Transitory Infiltration of the Lung with Eosinophilia. Löffler's Syndrome.—*Arch Intern Med* 1940 Dec Vol 66 No 6 pp 1215-1220 With 1 fig 11 refs. Summary appears also in *Bulletin of Hygiene*

It is important to recognize the condition known as Löffler's syndrome because the clinical findings and the X-ray appearances are similar to those of pulmonary tuberculosis and in fact it has been thus wrongly diagnosed.

The cardinal signs of Löffler's syndrome are: Signs of pulmonary disease revealed by percussion and auscultation; X-ray shadows; transience of pulmonary signs and eosinophilia in the peripheral blood. The authors state that 105 cases have been reported—they give a table of 104; their own would make the total correct—of which Löffler himself has reported 51. Of the total 82 were adults, 23 were children. The present case occurred in Palestine in a woman of 25 years. For six years she had been subject to respiratory catarrh and asthma (but no allergy could be determined). When seen her temperature was 100 F. and she had pain in the left side on coughing; an enlarged gland over the middle of the left clavicle painful to the touch; below the left clavicle and posteriorly over a corresponding area the size of the palm was decreased resonance, diminished breath sound with surrounding bronchial breathing and a few fine crepitations. No asthma. The diagnosis was infiltration in the upper lobe of the left lung, perhaps tuberculous (but no bacilli were seen). Next day X-ray showed infiltration in the middle field of the left lung. Eight days later there developed suddenly diffuse bronchitis with moist râles over both lungs, but no rise of temperature and no further X-ray signs. Two days later the bronchitis was clearing, and in three days more the patient left feeling well and the X-rays revealed all clear. Eosinophils on entry were 22 per cent and thereafter varied between 12 and 21 till two days after she went out to work again when it was 8.5 per cent.

The cause is not known. ENGEL in China [*Bull of Hyg* 1936 Vol 11 p 296] and KOINO in Japan ascribe it to allergic states e.g. blossoming of privet but this has not been observed in Europe. In some respects it resembles coccidioidomycosis [see this *Bulletin* 1939 Vol 36 pp 507-508 1940 Vol 37 p 882]. Allergy it is generally agreed does play a part in the pathogenesis but what is the source and what part it plays have yet to be discovered. H H S

FRIMODT MÖLLER (C) & BARTON (R. M.) A Pseudo-Tuberculous Condition associated with Eosinophilia.—*Indian Med Ga* 1940 Oct. Vol 75 No 10 pp 607-613 With 7 figs on 2 plates [Summary appears also in *Bulletin of Hygiene*]

The authors describe a condition which they have seen frequently at the Union Mission Tuberculosis Sanatorium Arogyavaram S India of eosinophilia associated with characteristic X ray appearances which differs from Loeffler's syndrome in that it is not transient which has no apparent connexion with tuberculosis syphilis or heart disease and which is probably not caused by helminthic infection. The authors believe the condition to be allergic in origin but are by no means dogmatic in their opinion.

Of the 175 patients studied, 106 had more than 5 000 eosinophils per cmm. of blood on admission in some the relative count was as high as 90 per cent. or more. In the remainder the eosinophils were not so numerous but were usually well above the normal level.

The X ray appearances are characterized by extensive mottling over both lung fields usually evenly distributed the size of the shadows is about 2 mm. and there is usually a certain amount of increased striation. The general appearance is something similar to miliary tuberculosis or to silicosis. In none of the patients however were the X ray appearances typical of tuberculous infiltration. The symptoms are fever cough sputum loss of weight chest pain and sometimes haemoptysis. Physical signs sometimes indicate tuberculosis but very few of the 175 patients seen had tubercle bacilli in the sputum and the majority were negative to tuberculin. Furthermore the prognosis is good in some patients followed for several years the condition has remained unchanged.

In discussion the authors consider pneumoconiosis as a possible cause of the condition but find little evidence to support this view. Changes in the lungs might be produced by infection with *Ascaris* or hookworm but if this were the cause the eosinophilia (usually an acute reaction of allergic type) would probably disappear even if the lung changes remained. The patients have been observed over periods of several months when it was unlikely that reinfection of any size either with *Ascaris* or hookworm could take place yet the X ray and eosinophilia remained unchanged. Typical asthma was not a feature of this disease. It is possible that several factors are concerned.

C W

FRIMODT MÖLLER (C) A Scheme of Control of Tuberculosis in India by 'Organized Home Treatment'.—*Indian Med Ga* 1940 Oct Vol 75 No 10 pp 577-581 [Summary appears also in *Bulletin of Hygiene*]

The author points out the great dissimilarity between conditions in India and those in Europe in regard to the existence of facilities for

controlling tuberculosis, and shows that there is no possibility of the early provision of institutions on such a scale as to be capable of receiving the mass of tuberculous persons (estimated by some as 2 millions by others as many as 5 millions). The scheme which he puts forward he calls organized home treatment, the aim of which is to apply as much as possible of modern specialized treatment and prevention to the patients and contacts in their homes. Though institutions cannot cope with the whole problem it is necessary that as many as possible be formed as the basis from which modern methods can be carried into the homes. The tuberculous clinic is therefore essential and should be instituted in every large city. At this clinic artificial pneumothorax treatment should be given. Hospital wards and sanatoria should be provided wherever possible since surgical collapse of the lungs will be needed.

Facilities for training of medical men and the ancillary services would exist in these institutions and the author emphasizes the importance of collaboration between specialist staffs and general practitioner. After-care is necessary and the provision of colonies will eventually be needed. Education of the sick, the relatives and of the general population must be provided for.

The paper is written in general terms but the reasoning is sound and the plan perfectly feasible.] C II

BERMAN (Charles). The Clinical Features of Primary Carcinoma of the Liver in the Bantu Races of South Africa.—*South African J Med Sci* 1940 Oct Vol 5 No 4 pp 92-100 With 5 figs. (68 refs)

The clinical manifestations of 66 Bantu cases of primary carcinoma of the liver are presented.

On symptomatological grounds these cases have been classified into five clinical groups—(i) frank cancer (63.6 per cent) (ii) acute abdominal cancer (9.1 per cent) (iii) febrile cancer (7.6 per cent) (iv) occult cancer (15.1 per cent) (v) metastatic cancer (4.6 per cent).

In frank cancer the signs and symptoms were referred to the liver from the on-set in patients who were previously in good health. The mode of onset was gradual. The symptoms were asthenia, 86 per cent of cases abdominal pain, 90 per cent dyspnoea, 26 per cent. The physical signs were loss of weight and emaciation 81 per cent enlargement of the liver 100 per cent tenderness of the liver 80 per cent jaundice 43 per cent ascites 55 per cent dilatation of the superficial abdominal veins, 19 per cent oedema 29 per cent and haematemesis in one case. Secondary anaemia was a frequent feature.

In acute abdominal cancer the patients were unaware of their condition but suddenly developed acute surgical conditions of the abdomen due to rupture of carcinomatous nodules or erosion of blood vessel on the free margin of the liver. The mortality was high. Those cases which survived operation later developed the clinical picture of typical primary liver cancer.

The febrile group (the most rapidly growing form of primary liver cancer) displayed symptoms not unlike those of amoebic liver abscess.

The cases of occult cancer were usually discovered either during routine examination for complaints other than those attributable to disease of the liver or accidentally at autopsy.

Three instances of metastatic cancer are described these were due to secondary deposits in the lungs the ribs and the brain. In all these cases symptoms due to metastases completely overshadowed the primary lesion in the liver.

The prognosis was hopeless and the duration of the disease never longer than four months. The average length of stay in hospital was 18.2 days the most rapidly fatal cases occurred in Groups II and III.

The treatment was purely palliative. Surgical intervention was always impracticable.

CHIN (Sumn) Ueber die Tribouletsche Reaktion im Kot der Darmtyphuskranken. [The Triboulet Reaction in the Stools of Typhoid Patients.]—*Taiwan Igakkaï Zasshi* (Jl Med Assoc Formosa) 1940 Oct. Vol. 39 No. 10 [In Japanese pp 1625-1631 [12 refs.] German summary p 1632.] [Summary appears also in *Bulletin of Hygiene*.]

[This journal—and it is not the only one—has an annoying habit of using special names for tests or reactions without defining the reaction in question. The reviewer cannot find any reference to or description of the Triboulet reaction in the literature but as laboratory workers may know to what it refers this paper is abstracted here. In the very next article in this journal the author speaks of the Heilmeyer Krebs method and earlier of Wakeshima's egg-counting method in neither case giving any definition.]

Apparently Triboulet's reaction is one which gives positive results in typhoid fever increasing till the acme of the disease is reached about 3-4 weeks and then declining to a negative by the eighth week. The following percentage figures are given for successive weeks from the first to the eighth 66.6 86.2 90.0 85.7 47.8 25.0 12.5 and 0. The reaction is a faecal one and seems to go *pari passu* with the pathological changes in the bowel.

The author states that he tried it in 29 patients and found it positive in all whether mild or severe in relapses it was invariably negative. In 14 of the 29 the reaction was evident in 5 hours four of these fourteen died four ran a severe course the other six an average course. It is argued that if the reaction is given within the 5 hour period the course is likely to be severe and perhaps end fatally. It is therefore of some prognostic as well as diagnostic value. H H S

RAO (R. Sanjiva) & GANAPATHI (K.) Sulphathiazole in Some Experimental Bacterial and Virus Infections.—*Indian Med Gaz* 1941 Feb Vol. 76. No. 2. pp 78-81 [16 refs.]

The infections which formed the subject of this test were those of *Bact typhosum* *V cholerae* fixed rabies virus and vaccinia virus while the drugs employed were sulphanilamide sulphapyridine and sulphathiazole. Mice were used as the test animals except in the case of vaccinia virus where rabbits were employed. The virulence of both *Bact typhosum* and *V cholerae* was raised before the testing experiment.

was begun by serial injection, and young mice were used. Out of groups of 16 mice allotted to sulphanilamide, sulphapyridine, sulphathiazole and control experiments for *Bact. typhosum* with administration of the drug by glass pipette into the stomach, 12, 11, 11 and 0 animals respectively survived, so that all the types of drug showed very similar therapeutic effect and there were no survivors among the controls. No therapeutic value of any kind was found for *V. cholerae*, fixed rabies virus infection and vaccinia virus infection.

W. F. HARTON

CASANEDA (M. Ruiz) & CARDENAS (Clemente Carrillo). Treatment of Brucellosis with Brucella Antigens.—*Am. J. Trop. Med.* 1941, Mar. Vol. 21, No. 2, pp. 183-190.

Based upon a study of 35 patients with brucellosis, in 20 of whom *Br. melitensis* was isolated, this paper is devoted mainly to treatment by antigens prepared from the organism. In the remaining 15 cases diagnosis was based upon clinical findings aided by agglutination and allergic tests. Three clinical groups were distinguished: four were mild, twenty-five more severe and six gravely ill. Specific treatment was based upon a combined method of immunization and desensitization by means of antigens prepared from *Br. melitensis*, *Br. abortus* and *Br. suis* grown in bottle flasks on liver-agar for 48 hours. The preparation in which the main points are titration of the growth and centrifugation at high speed is described in detail. Eventually the supernatant fluid is titrated for its nitrogen content and diluted with formalized saline to contain 4.27 per cent.

The antigen now termed M.B.P. (according to the three types of Brucella) was standardized by testing it on the skin of normal persons and patients; by further dilution the standard was attained which caused definite allergic reactions in patients but none in normal person.

Treatment was commenced by intradermal injection of 0.2 cc. Subsequently injections are given twice weekly subcutaneously with gradually increasing doses to 2.5 cc. The injections are well-tolerated provided the reactivity of the patient is studied and none given if the temperature is over 40°C. In addition blood transfusion, liver extract and vitamins B and C have been administered, and in a few instances sulphanilamide and sulphapyridine were added.

In the mild cases improvement commenced 9, 12 and 43 days after the beginning of treatment and continued for 29, 37, 51 and 103 days respectively. In the severe cases (25 in number) recovery began 3 to 60 days after institution of treatment which was continued from 1 to 4 months. The six patients who were gravely ill reacted in a relatively short time. The period of observation, however, continued from 2½ to 7 months. In two cases treated with serum serotherapy was followed by sufficient clinical improvement to warrant resumption of antigen therapy.

P. Manson Bahr

MARU (A. M.). Some Minor Surgical Conditions treated with Cod Liver Oil.—*Ind. Bull. Bombay* 1940, Sept. 21, Vol. 8, No. 18, pp. 594-595.

The author advocates the use of cod liver oil as a dressing after cleaning up the affected area with eusol or spirit. The oil is boiled

before use and is applied on gauze boiling does not apparently reduce its efficacy The method is cheap and effective in promoting granulations He quotes cases of septic sinus cellulitis eczematous ulcer of the ankle lacerated wound and extensive scalding of the anus all treated successfully by this method C II

COULSTON (Frederick) **The Use of Diaphane for Mounting Glemsa Type Preparations**—*Jl Lab & Clin Med* 1941 Feb Vol. 26 No 5 pp 869-873 [14 refs]

It is well known that tissues stained with the Romanowsky stains lose their colour fairly rapidly on being mounted in balsam Euparal and a similar preparation diaphane have been recommended for mounting purposes and the author gives complete instructions for the methods of using these after dehydrating procedures involving the use of alcohol-acetone or of dioxane Details of staining and dehydration are described. The conclusion is that diaphane or euparal can be confidently recommended for the technical details the original must be consulted. C II

SAPRE (S N) **A Technique for cutting Serial Sections of Chitinous Objects**—*Indian Jl Vet Sci & Animal Husbandry* 1939 Dec Vol 9 Pt. 4 pp 411-413 With 1 fig

FAN (Ch uan) & CHEN (Wu min) **Variations in the Composition of Soybean "Milk"**—*Chinese Med Jl* 1940 Oct Vol 58 No 4 pp 479-482.

Soybean milk is much used in oriental dietaries and the authors have attempted to determine its composition in order to study the factors which might influence it Having obtained a supply of beans sufficient for the whole experiment, they prepared the milk by a standard basic process but modified the various procedures from sample to sample in order to determine the effects of these modifications on the resulting product The results show that even with strict supervision the composition of the milk made with the same procedure is not constant The specific gravity fat and nitrogen content may vary independently and significantly within a wide range

It is difficult therefore to draw conclusions but it is safe to say that in any experiment on metabolic balance it is unwise to assume that daily specimens made by the same process are equal With a proportion of bean to water fixed at 1 to 8 it is difficult to obtain a protein content as high as 4 per cent C IV

MOTTOUILLE (Léopold) **Medical Aspects of the Protection of Indigenous Workers in Colonies**—*Internat Labour Rev* 1940 Apr Vol 41 No 4 pp 361-370 [Summary appears also in *Bulletin of Hygiene*]

This is a paper written in general terms but it gives an admirable account of the principles of the modern enlightened treatment of native labourers It is pointed out that it is the duty of Government to instruct employers and employed as to the measures to be taken

to protect health, and that protection cannot be considered adequate unless account is taken of the moral and social well being of the workers and their families. Labourers come from places with widely differing environments and are generally unused to the kind of work they go to perform. It is therefore usually necessary to institute a period of training or of acclimatization, before entering on full labour.

The principle of voluntary labour is now generally accepted, and it is clear that compulsion of any kind is harmful to the health and output of the labourer. Employer would be wise to attempt, in accepting a task, to take into account the tastes and preferences of the workers.

Recruitment should be subject to medical examination but in the absence of a doctor recourse may be made to recognized indices of physical strength, though these should be corrected by imposing a minimum weight below which a worker should not be considered fit for industrial employment. In the Belgian Congo this minimum weight is over 140 lbm (110 lb). Diseases which definitely debar a man from being employed should be laid down by Government, as should those which debar from heavy but not from light work. Control of employment of women and children must be strict: women should not be employed during pregnancy or while nursing their children and no child under 16 should be employed. It is important to encourage men to bring their wives and families to their place of work. Morbidity and mortality rates are much higher in unmarried men than in married men accompanied by their families, and the latter form the ideal labour communities.

Food and food supply must be adequate and new arrivals should be vaccinated against any parasitic diseases and should be vaccinated against the diseases prevalent in the area. The period of initiation into tropical environment is the most dangerous to health and it may also be noted that sometimes recruits arrive in bad condition due to the conditions of the journey and to illness. A period of acclimatization with good food and medical attention is therefore often absolutely necessary.

The author gives a list of the social institutions established by the Union of the Upper Katanga: these are too numerous to be set out in detail here but mention may be made of the organization of committees to keep the worker in touch with the communities from which they came.

C. H.

LEE (Douglas, H. H.) *A Basis for the Study of Man's Reaction to Tropical Climates.*—*Ann. of Queensland Papers Dept. of Lands* 1940 Dec 30 Vol. 1 No. 5 88 pp. With 20 figs. 350 refs. 7s.

Medical physicians in Australia have for many years taken a deep interest in the problems of human residence in the tropical parts of their continent. At the Institute of Tropical Medicine at Townsville (founded 1929 incorporated in the School of Public Health and Tropical Medicine in Sydney) A. BRENN and W. J. YOUNG and their colleagues (the *Ann.* 1930 Vol. 15 pp. 284-298 1931 Vol. 18, p. 229) carried out a considerable number of investigations on the physiological effects of hot climates. They and other Australian writers notably CLEMENT (*Bull. of Hy.* 1928 Vol. 1 p. 667) and

more recently A. Grenfell PRICE [*Med Jl Australia* 1935 Vol 1 pp 106-110] have at different times marshalled the available facts in an attempt to answer some of the practical questions of white settlement in the tropics. For the most part they have had to conclude that a great deal more research was required yet they were able to pronounce on the value of large tracts of land for human habitation and also to point out deficiencies in various social and economic conditions *e.g.* in housing as suggested by physiological considerations.

Prof Lee of the new School of Physiology in the University of Queensland has recently begun to follow up these pointers of his predecessors as part of a comprehensive programme of research into tropical settlement (Fourth Report of the National Health and Medical Research Council of Australia. The Settlement of Tropical Australia. *Med Jl Australia* 1936 Vol 2 p 707). He is concerned as much with the study in the laboratory of the basic physiological effects of heat as with observations in the field and with the detailed application of these studies to the practice of tropical hygiene.

His present publication is practically a monograph on the whole subject of human existence in hot surroundings. In so wide a subject with so much of the literature in a chaotic condition this paper will be valued for introducing a good measure of clearly-conceived co-ordination. While a detailed criticism cannot be undertaken here it is worth taking note of one of the basic standpoints Lee has adopted.

In welcome contrast to many writers on this subject he has not indulged in a mere systematized cataloguing of myriad reactions to heat. He has in the first place specifically discriminated those reactions which may be truly regarded as *adaptations* to the climatic thermal conditions. The particular processes so differentiated find considerable justification in the available evidence of evolutionary and homoeostatic physiology. Thus the changes at the skin surface—vasodilatation rise in temperature sweating—in the respiration in water metabolism in the endocrine circulatory, excretory and other systems of the body all these can be shown by experiment to be causally interlinked in the homoeothermic adjustments.

As a consequence of this approach the general nature of permanent adaptation *vis* acclimatization and of maladjustment can be placed on a rational basis. The clinical pictures of heat disorders (heat stroke heat exhaustion heat cramps and dehydration) can be recognized in essentials as the pathological counterparts of a fairly definite though elaborate physiological integration. In doing this, Prof Lee has also been able to cover a large number of the isolated observations sprinkled over a great variety of journals (350 references are quoted).

But it must be admitted that the author has not entirely escaped the difficulties of this approach. Among the adaptive processes he lists as a secondary adaptation a rise in body temperature. It is true that a small degree of pyrexia will make for an increased loss of heat tending to stabilization—a definitely normal reaction as we know in the case of muscular exercise. But if the rate of temperature rise is fast and great enough the pyrexia clearly no longer fulfils this rôle. It becomes at once a sign of the failure of adaptation and (very probably) the essential agent in the pathogenesis of heat-stroke. The significance of a rise of body temperature needs very careful interpretation particularly as regards its associated physiological involvements. To maintain that this reaction to heat is an important adaptation seems

underrable it will tend to obscure the essential rôle of pyrexia where it is most significant that is in maladjustment.

A lesser criticism concerns the differentiation of secondary from primary adaptations. One would hesitate to say categorically that some of these processes do not come into operation in hot surroundings from the very beginning of exposure to heat. But this objection will no doubt be met as more precise results accumulate.

The wide field which Prof Lee has surveyed has only allowed the mentioning of the bare essentials of some important topics. This is so in regard to the pathology of heat-stroke a subject which admittedly abounds with many vague and ill-supported theories. One can sympathise also with what he writes concerning the physiology of acclimatization a good deal more must be achieved in examining, measuring and tabulating the facts of acclimatization first, before any serious attempt can be made to understand its mechanism.

In his discussion of the hygiene of tropical residence the author comes to the practical applications of physiological facts and principles under the heading 'Assessment of Climate' he reviews the different indices which have been proposed for judging (usually) the thermal comfort of the environment. Here he reiterates the findings of a recent paper on the evaluation of climatic regions of Queensland, in which he considers effective temperature the most useful index. (See this Bulletin 1940 Vol 37 p 879). In his comments on the possibility of selecting individuals for settlement in very severe tropical conditions no mention is made of the pioneer work of DREOSTI [this Bulletin 1935 Vol 32 p 494 Bull of Hyg 1936 Vol 11 p 747 1937 Vol 12 p 604] on the Witwatersrand, whose work has had valuable results in practice.

Concerning Protection against Heat Elements the author deals with clothing house construction air-conditioning personal and domestic habits. While this section is only dealt with summarily and lacks rather surprising omissions must be mentioned. The use of heat reflective metal foil in headgear and in housing is a development which is to have been overlooked. In practice aluminium foil has in the last few years found extensive use for dealing with radiant heat. The discussion on air-conditioning might well have included a mention of the unit air-conditioning plants which make the provision of cooling in hot climates of widespread practicability. These units have been on the market for some years and have given satisfaction in the tropics [Bull of Hyg 1938 Vol 13 p 161 1939 Vol 14 p 281].

Professor Lee's discussion of personal and domestic habits in the tropics based as it is on the nature of the bodily adaptations called into play is an admirable essay in applied physiology. It is a pity that the recent article by MARSH in the British Encyclopaedia of Medical Practice [Bull of Hyg 1938 Vol 13 p 645] has escaped attention. This very practical article would well supplement Professor Lee's able discussion.

LEE (Douglas H K) & BOISSARD (G P B) The Effect of Exercise in Hot Atmospheres upon the Pulse Rate.—*Med Jl Australia*, 1940 Dec 21 27th Year Vol 2 No 25 pp 664-668. With 4 figs.

Seven healthy male subjects carried out standard exercise in hot dry conditions (D B 101 F W B 79 F) and in hot moist conditions

(D.B 87.5°F W.B 83.5°F) When water loss was fully replaced the pulse rate was observed to rise to a higher level as a result of exercise (either walking or weight lifting) in the afternoon than in the morning. The level of water intake is more important in the hot dry than in the hot moist conditions. In the former replacement of half the water lost produces a marked improvement in reaction although administration of double this amount is no more effective. In hot moist conditions replacement of half the water lost causes a slight improvement. Saline solution instead of water seems to be a disadvantage in hot dry atmospheres but it causes some improvement in hot moist conditions. When ample water is given there is no difference between the effects of the two atmospheres but when water is withheld the pulse rate is raised much more by exercise in hot dry conditions. Acclimatization under the conditions of these experiments has only a minor effect in hot moist atmospheres but it may play a significant rôle in hot dry atmospheres. *E M Killick*

CLARK (Alfred) *Effects arising from Inhibition of Cellular Activities*
No 3—Selenium—*Jl Trop Med & Hyg* 1940 Oct 15 Vol 43
No 20 pp 250-252. [10 refs]

REVIEWS AND NOTICES

ZANZIBAR PROTECTORATE Colonial Development Fund (Malaria Research Scheme) Report of the Zanzibar Research Unit June 1934 to September 1937 [McCarthy (D D) M.B Ch.B (N.Z) D.T.M & H (Eng)]—pp u+141 With 2 maps 56 figs & 2 plates [Bibliography] 1941 Zanzibar Govt Printer [5s]

This is a well documented report of a comprehensive malaria survey of the Zanzibar Protectorate. The survey was carried out in two stages. Fifteen months were devoted mainly to a study of malaria in the municipal area of Zanzibar. A subsequent year was devoted to the study of malaria in rural areas of Zanzibar Island and in areas around the three chief townships of Pemba Island. Considerable space is devoted to a description of the history, geology, topography, and meteorology of the Protectorate, of the variety of races that constitute its population, of land tenure and ownership, and crops and food. The description is interesting but some of the matters dealt with have but little bearing on malaria and its problems. On the other hand one finds but very scant reference to causes of morbidity or mortality other than malaria. This is characteristic of many malaria survey reports. One sometimes regrets that malariology is so exclusive or rather so independent a branch of public health science.

Malaria is hyperendemic in the Protectorate. As in most countries of high endemicity it is difficult to measure the baneful effect of its prevalence on the well being of the population. The splenic index is from 60 to 80 per cent. Malaria is directly responsible for the deaths of some 1 200 persons a year. The population of the Protectorate is about 220 000. It appears that the total deaths from all causes exceed the number of births but figures are not given.

[September 1941]

Two species of *Anopheles* are responsible for the transmission of malaria *A. gambiae* and *A. funestus* the former is the more potent vector *A. funestus* is not found far from rivers or streams. Exacerbations in the severity of malaria have been noted about every ten years. *P. falciparum* is the predominant species of parasite *P. vivax* is very prevalent only in years of particularly active transmission. The report should be of great value to the Public Health administration of the Protectorate.

Norman White

TROPICAL DISEASES BULLETIN

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[No 10

SUMMARY OF RECENT ABSTRACTS *

VIII TYPHUS GROUP OF FEVERS

Proteus OX19 type Vectors louse and flea

IONESCO-MIHAESTI *et al* (p 255) report a serious outbreak of typhus in Bessarabia in 1936-37 and indicate the preventive measures taken which included isolation of cases and mass delousing of the general population. BARLOVATZ (p 565) describes louse-borne typhus in the forest region of the Congo giving clinical details. *Proteus OX19* and *OXK* are agglutinated in high titre. Children are seldom ill and mild cases may be mistaken for influenza, dengue or paratyphoid. Many of the natives appear to be immune. In the wards bed to-bed infection is rare but most of the imported ward personnel were attacked. CLEAVE (p 257) reports two cases of the *Proteus OX19* type in Hong Kong.

CASTANEDA and SILVA (p 259) recognize three types of typhus in Mexico: murine, intermediate and the historic type though there was no epidemic of the last about the time when the investigations were made.

KUCZYNSKI-GODARD (p 564) describes micro-epidemics of typhus in the Peruvian highlands. In silent areas *Rickettsia* infected lice have been found on the inhabitants though no cases of typhus have been seen and there is no evidence of *Rickettsia* other than those of typhus. It is thought that non immune people coming into contact with apparently healthy carriers of infected lice give origin to the micro-epidemics.

MACCHIAVELLO (p 255) found that after centrifugation of emulsions of tissues containing *R. prowazeki* the intensity of disease set up by injection of the supernatant fluid varies according to the number of *Rickettsiae* left in the fluid, and that if all the *Rickettsiae* are removed, the fluid no longer gives rise to the disease.

BLANC and BALTAZARD (p 573) lay down criteria required for the proof that a typhus virus is adapted to a particular insect host. They

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

have found that the virus of epidemic typhus can satisfy these requirements in the flea *Xenopsylla cheopis* (and presumably therefore may be transmitted by this flea).

MACCHIARELLO (p. 256) describes a new method of staining Rickettsiae.

JOHANN INFANTE (p. 238) describes a rapid microtest for typhus in which blood from a finger is used for agglutination of an emulsion of *Proteus* V19. There is apparently close agreement between this test and the full Weil-Felix reaction.

DANIEL ROLL and GRACIN (p. 566) show that in severe typhus there is an increase in the number of red blood cells and a leucocytosis due to an increase in the mononuclear cells. Typhus nodules are caused by toxic degranulation and multiplication of the endothelial lining of the capillaries. Plaques may be seen in blood films and their presence is a point of differentiation from typhoid. DANIEL ROLL *et al.* (p. 567) consider that the nervous symptoms of typhus are due not to toxic action in the nervous system, but to lesions in the capillaries of that system. The cerebrospinal fluid becomes yellow owing to the presence in it of altered blood pigments. They discuss the differential diagnosis from typhoid and relapsing fever and the method of prophylaxis including vaccination, which should be employed. LE RENARD and RAYNAUD (p. 258) describe a case of toxic nephritis in typhus which was relieved by decapsulation of one kidney. They regard the nervous symptoms of typhus as due largely to toxic nephritis.

DILWALL *et al.* (p. 565) describe polyneuritis with permanent damage as a sequel of typhus in Abyssinia.

GILLES and DILWALL (p. 257) treat their patients according to the anaemic diet, prevent with scurvy and beriberi giving ascorbic acid and vitamin B by injection. Pressure in the cerebrospinal fluid is relieved by lumbar puncture. MASTROT (p. 257) discusses the treatment of typhus. Convalescent serum may be used, with subcutaneous saquin and glucose for the toxæmia and cardiac stimulants.

DE LA RIVIÈRE (p. 570) gives a clear account of preventive measures to be taken in connexion with louse-borne typhus. General measures consist of supervision of populations, their movements and their standard of personal cleanliness. The layout of special typhus hospitals is discussed, together with methods of delousing by disinfection and by close cutting of scalp and body hair. Louse-proof clothing for workers is referred to and mention is made of prophylactic vaccination. NICOLESKO (p. 571) discusses the protection of medical workers by means of louse-proof clothing and vaccination. MURLESS (p. 571) writes of preventive measures taken during the war of 1914-1918 in Bulgaria and Turkey.

RICE (p. 249) records a case of ship typhus, with agglutination of *Proteus* O13 but not O119 in Hamburg. Rats captured in the docks gave positive Weil-Felix reactions in 1933 but the author considers in this instance that infected rats may have boarded the ship on which the patient was found, when it touched at a Spanish Mediterranean port. REITLER *et al.* (p. 250) describe endemic typhus as seen in Palestine where it is usually a disease of non-immunized immigrants. Two types are distinguished, in both of which *Proteus* V19 is agglutinated, the one moderately severe the other

very severe CELIK (p 841) notes that in Istanbul certain cases of typhus (presumably murine) show strong reactions with *Proteus OX1* rather than with *OX19* thus resembling the Lima type

MAISTER *et al* (p 260) have isolated strains of murine virus from rats fleas and from one human patient employed in a grain store in Natal S Africa this is the first time this virus has been isolated there but cases of flea borne typhus have probably occurred before

Cases of typhus with positive reactions to *Proteus OX19* are reported from Bombay by PATEL (p 840) and from Bangalore by SHARMA (p 840) In many the provisional diagnosis of typhoid had been made until negative Widal and positive Weil Felix reactions revealed the true nature of the disease The vector is probably the rat flea WOLFF (p 261) isolated a murine strain from rat fleas from the house of a typhus patient in Ceylon

WOLFF and DE GRAAF (p 262) state that shop typhus [the murine form] in which the serum agglutinates *Proteus OX19* is not uncommon in Java Agglutinins appear late however and for blood to be infective for animals it must be taken during the period of fever The scrotal reaction is produced in guineapigs and the authors point out that similar reactions may be given by *Spirillum minus* and *Pfeifferella whitmorei* though there are certain differences The *Proteus OAK* type of typhus virus does not give the scrotal reaction so frequently as the murine type.

RAYNAL *et al* (p 256) record an outbreak of 1 000 cases of murine typhus in Shanghai in 1938 but consider that this disease was transmitted from man to man by the louse The strains isolated from man appear to be intermediate between the murine and the classical human types and thus indicates that the murine type escaping from the rat flea rat cycle can attempt adaptation to the man louse-man cycle achieving *en route* various stages which mark its progress towards a historic typhus virus In this connexion the finding of SPARROW (p 267) that murine virus can multiply abundantly in the intestine of the louse, is noteworthy RAYNAL (p 569) further states that though *Ctenocephalus musculi* were found on infected rats no virus could be isolated from them No fleas of the genus *Xenopsylla* could be found.

LIU and CHUNG (p 261) have isolated murine strains from man rats and fleas in Peiping

In North America endemic typhus has recently spread more and more from the coast of the Southern States into rural areas and for this DYER (p 571) suggests two reasons mass rat migrations due to increased cultivation of food crops in place of cotton and the fact that field mice have been found infected in nature BOWDOIN and BOSTON (p 842) discuss the epidemiology and control of endemic typhus in Georgia U.S.A. Control is largely a matter of rat extermination or exclusion BOSTON (p 842) indicates the principles of rat control MUSSER (p 841) notes that the typhus of Louisiana is entirely of the murine type. PONS (p 841) reports murine typhus from Porto Rico

BLANC and BALTAZARD (p 572) show that there is no loss of virulence in murine virus preserved in the faeces of fleas so long as the faeces are dry over a period of 651 days This long persistence may explain much that is obscure in the carry-over of infection from season to season and country to country

SPARROW (p. 267) has shown that the virus of murine typhus multiplies abundantly in lice after introduction into the anus. [See also RAYNAL and FOURNIER above.] BLANC *et al* (p. 282) have shown that the faeces of lice (*Harmatopinus asini*) removed from donkeys which had been infected with murine typhus were infective between the 10th and 20th day from the inoculation of the donkeys. LILLIE *et al* (p. 572) show that focal typhus nodes are produced in the brains of small rodents such as mice and rats by the virus of endemic typhus but less constantly by that of Rocky Mountain fever. PAYG (p. 281) shows that murine Rickettsiae are able to produce local lesions on the chorio-allantoic membrane of fowl embryos as well as a generalized infection which often kills the embryo. FIDELAYSON and ROHLER (p. 581) find that guinea pigs inoculated with killed Mexican murine virus are protected against the S African epidemic strain. This also (p. 581) shows that the viruses of identical but that the murine viruses they have worked with produce only inapparent infection in rats and mice.

Proctos OLA type vector mite

In the Simla hills WEBSTER (p. 57) has been able to isolate a *Proctos OLA* type of virus from rats and a *Proctos LA* type from human cases but not vice versa nor has the *LA* type been isolated from mites on rats or from the larval *Trombicula deliensis* found on local monkeys.

WOLFF and DE GRAAF (p. 264) report two cases of mite-borne typhus from Java in which densely populated and highly cultivated island it is as a rule rare though flea borne typhus is common. A strain of Rickettsia from one of these patients was found to be identical with Sumatran strains and a Malayan strain of scrub typhus. Field rat (*Rattus ferrugineus*) from the area in which these men contracted the disease were examined, but none was found infected as a reservoir for the disease without showing objective symptoms. DELAND (p. 285) notes that cases of typhus seen in New Guinea were of the *Proctos OLA* type with mild symptoms and that no primary sore was seen. DELBOY (p. 265) notes that both murine typhus and tsutsugamushi are found in Indo-China. MORISHITA (p. 286) reports a seasonal prevalence of tsutsugamushi in Formosa with its peak in July. The case mortality rate in his series was 12 per cent.

LEVINTHAL and SAVOOR (p. 576) point out that tsutsugamushi rural typhus and scrub typhus are identical in all respects. It has been thought that the presence of a primary sore indicated tsutsugamushi and that the absence of this lesion was characteristic of scrub typhus, but the authors do not accept this distinction, since the primary sore may be so slight as to be missed, or may have disappeared at the time of examination. They therefore propose the adoption of the name tsutsugamushi for all these fevers, and that the names rural and scrub typhus should be dropped. The same authors (p. 847) have also examined by means of pathogenicity and cross immunity tests strains of the virus of Sumatran mite fever which they find to be identical with that of tsutsugamushi. KOFWEKAAR (p. 846) gives a detailed description of the pathological appearances

found in Sumatran mite fever and in scrub typhus. These appearances are the same in both diseases. They differ from those of classical typhus and endemic typhus in that the chief change is a perivascular infiltration only secondarily attacking the intima whilst in the classical and endemic forms the primary lesion is destruction of the intima and media followed by perivascular infiltration. KOTTER (p 577) maintains that there is a valid distinction between Sumatran mite fever and scrub typhus and refers to the typical primary punched-out ulcer in the former which, he states is not found in scrub typhus. Sumatran mite fever is very common in the north of the island.

For the second time LEWTHWAITE (p 847) has isolated a virus identical with stock *Proteus* OXA strains but which was obtained from a guineapig infected with strain E originally a *Proteus* OX19 strain from rats caught on an estate where tsutsugamushi was present.

LE COSQUINO DE BUSSY and VAN LOGHEM (p 266) have tested strains of *Proteus* isolated in Holland against sera from shop and scrub typhus from Sumatra. With shop typhus sera the agglutination was weak but with scrub typhus sometimes reached a titre of 1 in 10 000 indicating that an X component is inherent in every strain of *Proteus*. Strongly agglutinated strains completely absorbed Rickettsia agglutinins from the scrub typhus sera.

Indeterminate type Vector tick

GEAR and DE MEILLON (p 263) state that cases of tick borne typhus continue to be reported from the Witwatersrand in people associated with tick infested dogs, and show that *Haemaphysalis leachi* the dog tick is capable of transmitting the infection while biting. Guineapigs which have recovered from this infection are not protected against louse-borne or flea borne typhus nor do these infections protect against tick-borne typhus. MACVICAR (p 263) reports four cases of tick borne typhus at Lovedale S Africa.

ROBERTS (p 260) refers to typhus in Kenya. There is one form which resembles boutonneuse fever is transmitted from dog to man by *Rhipicephalus sanguineus* and which in one case gave a reaction to *Proteus* OXA but not to OX19. In this type there is a primary sore but there is a second type which resembles murine typhus. LE GAC (p 575) records a case of apparently tick borne typhus in Oubangui the patient's serum showed complete neutralizing power against Rocky Mountain virus partial against boutonneuse virus, but none against the virus of endemic typhus. SALEUN (p 263) describes a case of probable boutonneuse fever in Brazzaville.

JOLLY and DI RUGGIERO (p 268) report a case of typhus from Guadeloupe in which the Weil Felix reaction to *Proteus* X19 Kingsbury O was positive at a titre of 1 in 2,500. They state that it resembled boutonneuse fever and was probably transmitted by an Ixodid tick. [The strain of *Proteus* used is not clear. Guadeloupe is so far from the regions in which the *Proteus* OXK form of typhus (tsutsugamushi) is found that it can hardly have been the same disease.]

Although strains of Rocky Mountain fever virus isolated in the Eastern United States have hitherto been less virulent for guineapigs than those isolated in the West TOPPING and DYER (p 843) now report a highly virulent strain recently isolated in Washington and give details of its effects on guineapigs.

TRAVASSOS and DIAS (p. 574) have established the identity of the viruses of the spotted fever of Minas Geraes, São Paulo and the Rocky Mountains.

HOLLAND (p. 843) gives information concerning *Dermacentor andersoni* in Alberta where it is thought to be extending. Ground squirrels and hares are probably the hosts for larvae and nymphs but domestic stock are the principal hosts for the adults. Open, dry country is less infested than small deep valleys, since the ticks are sensitive to low humidity. Ticks were found on low bushes and various grasses.

ROBERTS (p. 844) gives instructions as to the elimination of *Rhipicephalus sanguineus* from dogs and their kennels in Australia. Derris as a powder or wash should be used for the animals and the kennels should be carefully sprayed with creosote or crude oil and old bedding should be burned or boiled. [Although this tick has not been associated with human disease in Australia it is a vector of boutonneuse fever in France and has been suspected in India.]

TORRING (p. 575) reports some apparent success in the treatment of experimental Rocky Mountain fever with immune serum but found (p. 264) protiool and sulphapyridine to be of no value in the disease.

Vaccination

In a comprehensive review MURCATROYD (p. 848) has summarized present knowledge of immunisation against human rickettsial diseases. FINDLAY in discussion of this paper points out that in N. Africa the natives possess a certain degree of inherited or acquired immunity and that their reactions to vaccination are slight but that the reactions of Europeans to living vaccines of the murine type are severe. Killed vaccines confer a certain amount of immunity.

In the cultivation of the Rickettsiae of typhus TCHANG and MATHEWS (p. 578) show that inoculation of material into the yolk sac of egg avoiding the embryo gives better results than inoculation into the embryo. COX and BELL (p. 580) report on the protection afforded to guinea-pigs by inoculation with the viruses of epidemic and endemic typhus prepared from infected chick embryo. COX (p. 268) refers to the protective action in animals of a vaccine cultivated in embryonic fowl tissue, and killed with carbolic acid. ZWISLER *et al* (p. 560) obtained profuse growths by infecting minced chick tissue by means of egg yolk cultures, and spreading the tissue over agar surfaces. ZIA *et al* (p. 579) have cultivated the Rickettsiae of epidemic typhus in sterile mouse embryo tissue in human serum Tyrode solution on agar. The growths were killed with Merthiolate and carbolic, and the vaccine thus prepared was found to be non-infective but capable of producing a positive Weil-Felix reaction.

MACCHIARELLO (p. 255) shows that in infected guinea-pig tissues, ground, dried and frozen the European virus remains alive for at least 53 days, the Mexican for 79 days. Either could therefore be despatched for vaccination purposes.

DURAND and his fellow workers (pp. 572, 579-849-850) have shown that if the viruses of typhus, boutonneuse fever and Rocky Mountain fever are inoculated into mice, rabbits and squirrels by the nasal route, the result is haemorrhagic pneumonia in which masses of Rickettsiae are found in the lungs. These Rickettsiae, emulsified in formalin, have been used to vaccinate guinea-pigs, and have been successful.

In man and monkeys vaccination by this method produces positive Weil-Felix reactions. CASTANEDA (p 261) has shown that typhus *Rickettsiae* produce pneumonic lesions in rats and rabbits.

LAIGRET and DURAND (pp 266 267) state that if typhus virus is passaged alternately through the brain and peritoneum of mice there can be produced from the brains a vaccine of high and constant virulence which can be titrated. The mouse brain is emulsified in egg yolk and then dried. It can then be kept for 95 days at refrigerator temperature and has been used successfully for the vaccination of 7 000 persons.

KAWAMURA *et al* (p 269) consider that the Pescadores strain of *tsutsugamushi* passaged in the testes of rabbits for 181 generations and producing only mild fever in man may be used as a vaccine in the endemic regions. This strain has been used in the treatment of general paralysis of the insane.

PINKERTON and BESSEY (p 268) found masses of *Rickettsiae* in the peritoneal exudate of rats infected while suffering from riboflavin deficiency and suggest that this fact might be made use of in the preparation of vaccine.

LAIGRET (p 850) has experimented with a method of vaccination against typhus by application of a vaccine to the scarified skin.

SPARROW and MARESCHAL (pp 268 850) infected men with a murine virus contained in the intestines of inoculated lice by instillation of an emulsion into the conjunctival sac. Mild fever was produced but no virus could be found in the blood. The men were later found to be immune to inoculation of classical and murine typhus.

BLANC and BALTAZARD (p 580) show that vaccination with a living murine vaccine attenuated by treatment with bile in a single dose produces solid and lasting immunity—in one case for 5 years—against murine and epidemic typhus. The excreta of fleas are dried, and in this state the virus persists for at least two years. Treatment with bile though attenuating the virus does not alter its infectivity. They (p 269) state that a febrile attack due to murine typhus or an inapparent infection produced by bile-treated vaccine will protect against both murine and epidemic typhus for at least 5 years.

MARIANI (p 578) points out that the non pathogenic *Rickettsia rocha-limae* is found in a large proportion of lice in Abyssinia. It occurs in louse faeces and may give rise to error in the preparation of vaccine by Weigl's method and it is possible that the theory of a rickettsial origin of trachoma may have arisen through overlooking this fact.

In a pamphlet sent out by the Pasteur Institute of Algiers (p 569) it is claimed that immune serum can bestow immediate passive immunity to typhus, and should be used by those investigating outbreaks if they are attacked by lice. The immunity lasts from two to three weeks. Working with concentrated convalescent serum OVALLE SÁNCHEZ (p 841) concludes that its injection is harmless but that in prophylaxis its activity is slight if given towards the end of the incubation period.

Q fever

In investigations on the *Rickettsia* of *Q* fever BURNET *et al* (p 253) have found that sera from man and animals infected with other *Rickettsial* diseases do not agglutinate *Rickettsiae* of *Q* fever. The serum of rabbits infected with *Q* fever virus agglutinates these

Rickettsiae but does not agglutinate any strain of *Proteus*. Guinea-pigs protected by Rocky Mountain fever vaccine are not protected against Q fever but protection against Q fever is active against the virus recovered from wood ticks in Montana, and the serum of patients recovered from Q fever protects against the Montana strain. BURKART and FREEMAN (p. 563) have demonstrated the essential similarity between the Rickettsia of Q fever and the strains isolated from ticks in Montana, except that the latter are the more virulent.

DEBRICK and SMITH (p. 851) have found a bandicoot, *Isodon trossus* naturally infected with the virus of Q fever in Australia. *Hemaphysalis haemeros* is known to be a natural vector of this disease in animals and SMITH (p. 851) has investigated its importance in producing infection in man. The faeces of infected ticks are highly infective and are capable of infecting guinea-pigs even through the unabrased skin. This would appear to be the natural mode of infection of vertebrates, and in some cases abattoir workers may acquire the disease in a similar fashion.

PARKER *et al* (p. 234) report the finding of Rickettsiae in *Amblyomma maculatum* in Texas which give complete cross immunity tests with Rocky Mountain and boutonneuse fevers though they are not identical in all respects. COX (p. 234) has shown that this Rickettsia cannot be cultivated in a cell-free medium. The outstanding characteristic is that it can pass through filter and on this account the name *R. dispora* is suggested.

DAVE (p. 562) has recovered *R. dispora* from *Dermacentor andersoni* captured in Wyoming.

COX and BELL (p. 562) have cultivated *R. dispora* in tissue culture and in developing fowl embryo. Charles H. Stoeck

MALARIA.

PREFACE OF ABSTRACTS IN THIS SECTION

GARDNER (p. 557) calls attention to the increasingly large number of seamen recently arriving in Britain with malaria, which should be borne in mind in diagnosis.

BATES (p. 558) discusses the races of *Anopheles maculipennis* of which seven may be differentiated in Italy and Albania from egg types. He gives a list of the names given to these races by several workers, with a proposed classification and notes on the geographical distribution.

SYMES (p. 559) discusses malaria in Nairobi, where the only important vector is *A. gambiae*. In the dry season breeding occurs in a few permanent foci only but with the advent of the rains larvae are to be found in almost every available pool, pit and puddle most of which are man-made.

RUSSELL and RAO (p. 559) show that in rice fields in Tanjore *A. culicifacies* breeds in wet fields before ploughing but that breeding is checked when the rice attains a height of 12 inches or more above the water at this stage *A. tritaeniorhynchus* is more plentiful. Intermittent irrigation with two consecutive dry days each week prevents the production of adults, and the authors think that the planting of rice

in field channels might control *A. culicifacies* without serious obstruction to the flow of water. Although *A. culicifacies* is the dominant anopheline in the eastern Satpara mountains WHITE and ADHIKARI (p 560) believe that it plays only a minor part in malaria transmission. *A. fluviatilis* and *A. varuna* are the principal vectors. WHITE and NARAYANA (p 561) confirm that in the Singhbhum hills the only vectors are *A. minimus*, *A. fluviatilis* and *A. varuna* and show that control measures have had considerable success.

GABALDON and his co-workers (pp 561-562) show that if mosquito traps are used in stables more are caught on the first than on subsequent nights. For comparing catches at intervals therefore the results on the first night of each period should be chosen. These traps are useful for *A. albimanus* but not for *A. darlingi* in Venezuela. The mosquitoes can be caught in traps in which a donkey is the bait between 7 and 8 a.m. since few anophelines escape before that time.

MER *et al* (p 562) show that the red blood cells of malaria patients treated with quinine are laked by bile more quickly than those of untreated malaria patients and much more quickly than those of normal persons.

In patients with quartan malaria who showed oedema BOYD and PROSKE (p 563) found conjunction between oedema, albuminuria and reduction in plasma protein which indicates nephrosis rather than nephritis.

VENHUIS (p 563) notes that contamination of distilled water used for Giemsa's stain with *Bodo caudatus*, a flagellate, may lead to errors in the diagnosis of malaria, since the flagellates may be transferred to the slides and may be mistaken for benign tertian parasites. To prevent this freshly distilled water should be employed.

HILL and CAMBOURNAC (p 564) conclude that in the Portuguese rice fields the only feasible control measure is intermittent irrigation: water is turned on for 10 days and is then turned off for 7 days. MONDAL (p 564) describes anopheline control by dry weather stream training in the Jeypore hills.

RUSSELL *et al* (p 564) describe a method of applying Paris green in which the powder is suspended in kerosene and powdered egg albumin diluted with water and sprayed from a pump. The method is effective, cheap and simple. CHOPRA *et al* (p 565) discuss the action of pyrethrum on mosquito larvae.

VANDERPLANK (p 565) describes certain small fish, closely allied to *Gambusia*, which are indigenous to East Africa and which should be of greater local value than *Gambusia* in malaria control.

Bird malaria. BECKMAN (p 566) estimates the intensity of infection in bird malaria by the time taken to count 20 parasites.

JACOBI (p 566) records studies on the biology and pathology of *P. gallinaceum*. BELTRAN and LARENAS (p 567) record observations on the schizogony cycle of *P. gallinaceum*.

TERZIAN (p 567) reports a study of *P. lophurae* infection in fowls. RIVERO and RAMIREZ (p 568) use *Haemoproteus columbae* infections of pigeons for testing the effects of antimalarial drugs. C IV

GARDNER (A) *Malaria among Merchant Seamen.* [Correspondence.]
—*Brit Med J* 1941 Jan. 25 p 134

The writer of this note calls attention to the increasingly large number of seamen arriving in Britain from malaria infected ports.

[October 1941]

and to the importance of doctors bearing the possibility of malaria infection in mind when called upon to treat such men. He was recently called to see ten seamen in a ship who were thought to be suffering from gastric influenza. All these men were suffering from malaria.

COVILL (G) Lectures on Malaria.—*Health Bull* No 5. *Male* is Bureau
No 7 33 PP 1940 Delhi Manager of Publications [Am. 5
or 6d]

BATES (V) The Nomenclature and Taxonomic Status of the
Mosquitoes of the *Anopheles maculipennis* Complex.—*Ann Ent
Soc Amer* Columbus Ohio 1940 Vol 33 No 2 pp 343-356.
(41 ref) Summarized in *Rev Applied Entom* Ser B 1941
Mar Vol 29 Pt 3 pp 41-42

Students of the problem agree that the mosquitoes formerly included under the single taxonomic concept of *Anopheles maculipennis* form a group of more or less independent populations distinguished by various physiological and morphological characters. There is little agreement however regarding the taxonomic categories to which these populations should be assigned and some twenty latitudes names have been applied to them. The author therefore reviews the definitions and general usage of the categories subspecies and race (geographical and biological) subspecies and species and recapitulates the points of difference between the *maculipennis* populations, particularly those observed by himself in material from Italy and Albania. He found seven types of eggs the only difficulties in classification being between *melanoon* Hackett & Mrazek, and *mesoae* Flin. In the first case the distinction seemed to be purely geographical and thus sub-specific, and in the second there appeared to be a phenotypic variation due to temperature. All other characters were found to be definitely correlated with the egg differences. The branching of the antepalmate hair of the fourth and fifth abdominal segments seemed to be characteristic for each population and it was often possible to identify individual larvae with some certainty. Except for *sacharovi* Flin (which is shown by hybridization to be an integral part of the complex) the adults are not readily distinguishable by morphological characters, though there are differences in male genitalia in the case of some of the populations. Physiological differences correlated with egg types occur in the ecology of the larvae and their survival in salt solutions and in the ecology of the behaviour food reactions and hibernation of the adults. Hybrids between the populations show various degrees of sterility.

The author considers that these differences have not been recently evolved and are in the case of some of the populations of specific value. He gives an annotated list of the available names in the *maculipennis* group followed by a proposed classification with notes on the distribution and synonyms of the species and subspecies he recognizes which may be summarized as follows. *A. maculipennis* Flin (*typicus* Hackett & Mrazek) and *A. mesoae* Flin are widely distributed in Europe but the latter does not extend so far south as the former. *A. melanoon* Hackett appears to be limited to the Italian peninsula, while *A. melanoon subulpinus*,

Hackett & Lewis is found in Spain northern Italy and throughout the Balkans *A. labbranchiae labbranchiae* Flin (*pergusae* Missiroli ? *sicanilis* Roub) seems to be limited to Italy Spain certain Mediterranean Islands and north Africa, while *A. labbranchiae atroparvus* van Thiel (*fallax* Roub *camboournaci* Roub & Treill) is widely but sporadically distributed in central Europe Their ranges are known to overlap in one district of Italy only *A. sacharovi* Favr (with questionable synonyms *clutior* Martini *clutus* Edw *martinius* Shing and *relictus* Shing) is a form occurring in the Near East. The name *A. occidentalis* D & K is appended to cover the American representatives of the group but it is thought that they may include several subspecies or even species (*aztecus* Hiffm) The names *alexandrae schingarevi* Shing *lewisi* Ludl. and *selenensis* Ludl. are considered to be of uncertain status

SYMES (C. B) *Malaria in Nairobi.—East African Med J* 1940 Nov & Dec. & 1941 Jan & Feb Vol 17 Nos. 8 9 10 & 11 pp 291-307 332-355 414-430 445-463 With 2 folding charts

This is a lengthy and somewhat discursive discussion of malaria in Nairobi interspersed with many quotations from many authorities dealing with the public health social and economic importance of malaria as an endemic disease The information supplied is mainly entomological and is based upon data collected by the author during routine mosquito surveys from 1926 to 1937 Nairobi has a population of 65 000 which is double that of 1926. The average number of malaria cases a year is about 900 of which 35 are fatal. It is stated that malaria has been a serious problem since the town was established and that its incidence has not decreased during the last ten years. It would appear that no sustained systematic attempts at its control have been undertaken until quite recently Eighteen species of *Anopheles* have been found in Nairobi The only vector of importance is *A. gambiae* During the drier months larvae are to be found in relatively few permanent breeding places Soon after the early rains of February or March breeding becomes much more extensive until June when larvae are to be found in great numbers in almost every available pool pit and puddle The majority of these breeding places are man-made. Suggestions are made for permanent control stress is laid on the desirability of abolishing the ideal facilities for *A. gambiae* breeding that are provided by the irrigation channels of the swamp used for market gardening N W

RUSSELL (Paul F) & RAO (H Ramanatha) *The Anopheles of Ricefields in South-Eastern Madras.—Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 427-446 With 1 chart & 10 figs on 5 plates

This is a further contribution to the study of malaria in the Pattukkottai Taluk of the Tanjore District [see this *Bulletin* 1939 Vol 38 p 131] Studies have been made to determine the importance of ricefields in the propagation of malaria and to obtain information regarding the breeding of all species of *Anopheles* in relation to season stage of growth of rice, and the state of the ricefield. Rice culture is described Ten species of *Anopheles* larvae were found in ricefields *A. annularis barbirostris culicifacies hyrcanus* var *nigerrimus jamei*

Pallidus subpictus testolatus *ragus* and *rurana*. The commonest species in fallow fields were *A. subpictus culicifacies* and *pallidus*. *A. culicifacies* the vector was most prevalent in wet fields prior to ploughing it was not abundant in nurseries. When the rice had attained a height of 12 inches above the water surface the breeding of *A. culicifacies* was checked. Thereafter *A. hyrcanus* became more plentiful. It seemed probable that the distribution and density of species was more dependent upon the stage of the rice than on the season of the year. The production of adult mosquitoes could be prevented by intermittent irrigation 2 dry days and 5 wet except during periods of daily rain. The planting of rice in field channels might control the breeding of *A. culicifacies* after the rice was 12 inches or more above the water surface and this without serious obstruction to the flow of water.

WHITE (R. SENIOR) & ADHIBARI (A. K.) On Malaria Transmission in the Eastern Satpura Ranges.—*Jl Malaria Inst of India* 1940 Dec Vol 3 No 4 pp 383-411 With 1 map A II

From September 1936 to April 1940 continuous observations have been carried out in the neighbourhood of thirteen stations on either side of the Vindhya Range which forms the eastern limit of the Satpura ranges in the Central Provinces. The area is mainly forest with clearings in which rice is grown during the rains. All but the larger streams dry up during the hot weather. The indigenous population are aboriginal Gonds and Bhagias. In some areas malaria endemity is low but here malaria epidemics at the close of the rains occur. In other areas endemity is very high. No work on malaria transmission in the Central Provinces had been done during the twenty years prior to this inquiry. KENNEDY (1914) believed that *A. culicifacies* was the important vector in the Central Provinces [the Bulletin 1915 Vol 5 p 38].

Twelve species of anophelines were encountered during the observations now reported: *A. culicifacies*, *A. fluvialis*, *A. varians*, *A. minimus*, *A. acutus*, *A. parvipes*, *A. splendidus*, *A. maculatus*, *A. theobaldi*, *A. karwari*, *A. stephensi*, *A. testolatus*, *A. jamaesi*, *A. annularis*, *A. pallidus*, *A. barbipes*, *A. hyrcanus* var. *nigripennis*, *A. stephensi* and *A. varians*. Dissections of specimens of all these were made with the exception of the last four. *A. culicifacies* is the dominant species.

The author believes it to play a very minor part in malaria transmission in the thirteen localities. A high sporozoite rate was very low as *A. fluvialis* had a high sporozoite rate in ten of the thirteen localities. Sporozoites were found even in one third of the rate as *A. fluvialis* in house catches but it had an even higher sporozoite rate in infective specimens. These two species *A. fluvialis* and *A. varians* were found in place to place and from year to year in the numbers resting in houses. *A. minimus* is very rare. Both *A. annularis* and *A. pallidus* were found infected but neither is thought to be of any importance in malaria transmission. In a severe epidemic in one of the stations, Dongargarh, research failed to incriminate any species as the chief vector.

WHITE (R. Senior) & NARAYANA (P. Appal) On Malaria Transmission in the Singhbhum Hills. Part II. An Experiment with Trap-Nets.—*Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 413-425

In a previous paper Senior White and Das reported that the only malaria vectors in the Singhbhum Hills were *Anopheles* of the *funestus* group [this *Bulletin* 1939 Vol. 36 p 14]. It was also shown that transmission occurs throughout the year except in the three months May to July. To confirm these conclusions a human-bait trap-net was set up in the village of Kolhadi where malaria is hyperendemic and a similar trap-net about a mile away in the centre of a protected area in Dangoaposi station. The results of twelve months catches in these trap-nets are recorded. Since 1938 anti larval measures at Dangoaposi have been restricted to the *funestus* group. The catches at Kolhadi show that there are no anophelines biting between March and June that the *funestus* group is not present in any quantity till the end of August oöcysts were found in *A. minimus* in the last week of August and sporozoites in *A. varuna* in the first week of September. The last sporozoites were found in *A. fluviatilis* in mid November. The nights are cold in December and transmission appears to stop. Comparing the catches of the two stations it would appear that control of *A. varuna* in Dangoaposi is complete that *A. minimus* has been reduced by more than 90 per cent and that nearly a third of *A. fluviatilis* remain uncontrolled. The vectors only penetrate the controlled area in any numbers in September and in the first half of October. It is confirmed that in the Singhbhum Hills the only malaria vectors are *A. fluviatilis*, *A. minimus* and *A. varuna*.

N W

ROY (D. N.) A Study of the Bionomics of *Anopheles subpictus* and *Anopheles annularis*—*Jl Malaria Inst of India* 1940 Dec Vol. 3 No 4 pp 499-507 With 6 figs.

VENKAT RAO (V.) & RAMAKRISHNA (V.) A Note on the Larva of *A. varuna* (Iyengar).—*Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 509-512.

OVERBEKK (J. G.) Malaria-onderzoek in de Kolonisatie Belitang (Residentie Palembang) in April 1940 [Malaria Investigations in Belitang]—*Geneesk Tijdschr v Nederl Indie* 1940 Sept. 10 Vol. 80 No 37 pp 2166-2177 With 1 plan.

GABALDON (Arnoldo) ANTONIO LOPEZ (Jose) & OCHOA PALACIOS (Manuel) Estudios sobre anofelinos Serie I 4 Variaciones curiosas de cuentas diarias de anofelinos en trampas-establo [Daily Variations of Anophelines Caught in Animal Traps].—*Publicaciones de la Division de Malariaologia* Ministerio de Sanidad y Asistencia Social. Caracas 1940 Aug 15 No 5 pp 33-39 English summary

From the experiments reported in this paper the following facts were noted

1 A baited stable-trap in one location caught more anophelines the first night than it did the second and third nights.

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"2 When a trap was observed for nine consecutive nights, the catches during the last six were smaller than those on the first night and compared with those of the second and third.

"3 These findings call attention to what appears to be a curious anopheline psychology for we do not have any explanation. If they are confirmed it may be concluded that daily consecutive readings of a baited stable trap in the same position gave figures that are about one-third the actual number of anophelines caught if the trap is used only one night in a new position. It follows therefore that weekly or monthly catches will be comparable only if the trap is used one night in a particular location of each determination.

GABALDON (Arnoldo) OCHOA PALACIOS (Manuel) & PEREZ VIVAS (M. V.) Estudios sobre anofelinos Serie I 5 Observaciones sobre lecturas de trampas-estable con cebo animal [Results Obtained with Animal Traps for Anophelines.]—*Publicaciones de la Division de Malaria y Ministerio de Sanidad y Asistencia Social* Caracas 1940 Aug 15 No 5 pp 41-56 English summary

The catches of adult anophelines in stable traps give information on the density of zoophilic species and the efficiency of the anti-larval measures. In Venezuela this kind of trap is useful where *A. albimanus* is the main vector but *A. darlingi* the other important one is not caught by these traps. A the anophelines were active before sunrise the present experiment were carried out in order to see if they escaped before the catch was made at 7 to 8 a.m. A donkey was used as bait. Less than three per cent of the mosquitoes caught escaped before sunrise. It is believed that such amount is insignificant to be taken into consideration as source of error when the catches are made after sunrise. No species showed a particular trend to escape more than another but in general the *Y. scutellaris* escaped more than the *Arribalgas* although the difference probably is not significant.

MEX (G) BIRNBAUM (D) & HUGLER (I. J.) Lysis of Blood of Malaria Patients by Bile or Bile Salts.—*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol 34 No 5 pp 373-378

Experiments were made to determine the relative sensitivity of normal and malarial blood, respectively to lysis. Tubes of 8 mm. diameter were used. Into each tube was placed 0.3 cc. of a 0.3 per cent saline solution of dried ox-bile (Difco) and one drop of fresh blood. The blood was uniformly suspended by shaking and the tubes were placed in an incubator at 37°C. until haemolysis was complete. The time required for complete haemolysis was the index of the sensitivity of the cells. Red cells of normal individuals laked in from 4½ to 5 hours. Red cells of malaria patients laked in from 3 hours the range being from 2½ to 5 hours depending on the duration of the attack. The red cells of malaria patients treated with quinine laked in from half an hour to 3 hours. Quinine or quinine-plasmoquine treatment increased the sensitivity to laking of the blood of malaria patients. The observations form an interesting contribution to the study of the aetiology of malarial haemoglobinuria.

BOYD (Mark F) & PROSKE (H O) Observations on the Blood Proteins during Malaria Infections.—*Amer J Trop Med* 1941 Mar Vol 21 No 2 pp 245-260 With 6 charts.

This is a record of observations on the proteins of the blood plasma of patients undergoing malaria therapy. It was hoped that such observations might throw light on the nature of the oedema sometimes observed in such patients. In a group of eight patients blood was collected for analysis during the incubation period and thereafter usually twice a week, till the expiration of the clinical attack or later. Only one of these patients developed oedema—he had a quartan infection. The second group consisted of two patients who developed oedema some time after the onset of a malaria attack when observations on plasma proteins were begun. A routine examination of urine for albumin and casts was carried out weekly. Ten cc of blood were placed in a sterile centrifuge tube containing 10 mgm. of dry purified neutral potassium oxalate. An estimation was made of the total protein, albumin, total globulin and fibrin in the blood plasma. An estimation of euglobulin was made in a separate portion of serum.

No oedema occurred in five patients infected with *P. vivax*. It occurred in one of three patients infected with *P. falciparum* and in both of the two patients infected with *P. malariae*. In the *P. vivax* patients plasma albumin was reduced but the reduction was not always accompanied by the appearance of albumin in the urine. In the *P. falciparum* patients albuminuria was more constantly associated with a depression in the plasma albumin but oedema was not significantly associated with such depression. In the patients infected with *P. malariae* albuminuria, a depression in plasma albumin and oedema appeared to be definitely associated. The conjunction of oedema, albuminuria and the reduction in plasma protein indicates that malaria infection produces a nephrosis rather than a nephritis.

N W

VENHUIS (W G) *Bodo caudatus* in bloedpraeparaten [*Bodo caudatus* in Blood Films].—*Geneesk Tijdschr v Nederl Indië* 1940 July 30 Vol 80 No 31, pp 1835-1841 With 3 figs on 1 plate English summary.

From a sanitated formerly malarious area, which is under constant supervision, an outbreak of malaria was reported. Larval and adult catches did not reveal anything wrong. So the attention was directed to the diagnosis of malaria. From the local Doctor we got over 30 thick films to check up. All these blood samples did not contain a single malarial parasite but all of them showed a flagellate namely *Bodo caudatus*, mostly in rather small numbers. These flagellates were mistaken for large trophozoites, younger schizonts or gametocytes of benign tertian malaria. The cause of all the trouble the *Bodo* could be found in the distilled water used for dilution of Giemsa's stain.

Only in one of the blood samples some of the flagellates showed their flagellae; in all the others they could not be seen at all. Only after restaining the flagellae could be made quite clear.

During the year 1939 two cases of this contamination were observed. The use of fresh distilled water will prevent this error.

HILL (Rolla B) & CAMBOURNAC (Francisco J C.) Intermittent Irrigation in Rice Cultivation, and its Effect on Yield, Water Consumption and Anopheles Production.—*Amer Jl Trop Med.* 1941 Jan. Vol 21 No 1 pp 123-144

Malaria in Portugal is almost limited to rice-growing districts of the south here the disease is hyperendemic. Experiments with intermittent irrigation of ricefields have been carried on since 1935. It has been consistently found that the periodic drying of the ricefields greatly reduces the number of mosquito larvae decreases the amount of water necessary for cultivation and, with most varieties of rice tested, increases the yield without detriment to quality of the grain. The water was turned on for 10 days then the field was drained, the water being turned off for usually 7 days. The complete *Anopheles* cycle in local conditions occupies at least 18 days. Under ordinary field conditions a reduction of over 80 per cent in the number of anopheline larvae found can be secured by intermittent irrigation. Special preparation of the fields is required. The conclusion is reached that intermittent irrigation is the only feasible method so far evolved for the control of *Anopheles* breeding in the ricefields of Portugal.

A IV

NOMDAL (R S) The Species Control of a Hill-Stream by Training.—*Jl Malaria Inst of India* 1940 Dec Vol. 3 No 4 pp 465-474 With 3 figs on 1 plate

The author describes a stream in the Jeypore Hills which in the dry season meandered in a bed, in part sandy and in part boulder strewn between high earth banks which form the flood season margins. Along the grass edges and among tree-roots *A. sinuatus* and *A. varians* the local vector bred in profusion. Larvae of these species are very rarely found near sand or boulder edges. When the river subsides in January, training of the stream becomes possible this is accomplished by a gang of six men with a sand plough and some spade work. This training renders culling unnecessary from January till the rains break early in June some 20 weeks along the 1½ miles of stream in which mosquito breeding is controlled.

A II

RUSSELL (Paul F) KNUTT (Fred W) & RAO (T Ramachandra) On using Water instead of Dust for diluting Paris Green in Malaria Control.—*Indian Med Gaz* 1940 Dec Vol 75 No 12 pp 740-742. With 1 fig

This dustless method of diluting and spreading Paris green was first described by BARBER RICE and MANDLIKOS (this Bulletin 1937 Vol 34 p 170). The authors of the present paper have modified the original method and have used it with marked success. A stock suspension contains kerosene oil 400 cc Paris green 200 cc and dry powdered commercial egg albumin 1 gm. The ingredients are put in the order mentioned, into a Winchester bottle which is then well shaken. The mixture is carried to the scene of operations in corked glass vials, 4 inches by 1 inch each vial contains 25 cc of the stock suspension. A khaki drill belt, of the cartridge belt type enables a coolie to carry from 20 to 25 filled vials. The remaining equipment consists of a tin measuring exactly 1,000 cc, a tin funnel with a wire

gauze sieve and a Hudson Sterling No 115 sprayer. On arrival at the breeding place 2 litres of water are strained into the sprayer tank to which the contents of one vial, after vigorous shaking are then added. Shaking with a little more water removes the last traces of Paris green from the vial. Three more litres of water are then added to the sprayer tank. The pump plunger is replaced and pumped to the desired pressure. The sprayer is slung on the back and spraying is done with the nozzle 1 to 1½ feet above the water surface. One vial of stock suspension is enough to cover about 500 square feet of water surface. Mosquito breeding was effectively controlled even in the presence of considerable vegetation. The method is effective cheap and simple.

N IV

CHOPRA (R. N.) ROY (D. N.) & GHOSH (S. M.) Action of Pyrethrum on Mosquito Larvae.—*Jl Malaria Inst of India* 1940 Dec. Vol 3 No 4 pp 457-463 [16 refs.]

The authors describe laboratory and a few field experiments on the mosquito larvicidal properties of Pyrethrum preparations. Quite small quantities of Pyrethrum powder can destroy all types of mosquito larvae in the laboratory in the field however its larvicidal properties are feeble. Small fish such as *Panchax panchax* are affected much more quickly than are anopheline larvae. The action of kerosene oil on mosquito larvae is enhanced by the addition of Pyrethrum the spreading power of the oil is greatly increased thereby. An aqueous extract of Pyrethrum has insecticidal properties although the two active principles, pyrethrin I and II are insoluble in water. The solid residue after the removal of pyrethrin I and II has both insecticidal and larvicidal properties. The insecticidal properties of Pyrethrum cannot always be correlated with its pyrethrin content.

N IV

VANDERPLANK (F. L.) *Nothobranchius* and *Barbus* Species Indigenous Anti-Malarial Fish in East Africa.—*East African Med Jl* 1941 Jan Vol 17 No 10 pp 431-436 With 3 figs

There are several species of small fish indigenous to East Africa and closely allied to *Gambusia* which, from the anti malaria point of view should be of greater local value than *Gambusia*. Some of these are described.

The genus *Nothobranchius* belongs to the Family Cyprinodontidae (egg laying tooth carps). *Gambusia* belongs to the Family Poeciliidae (live-bearing tooth carps). Four species of *Nothobranchius* have been recorded from East Africa. It is probable that they are identical with or at most varieties of *N. taeniopterus*. The male fish attains a length of 1½ in the female 1½ in. It occurs in seasonal pools but has not been taken from seasonal streams or rivers. The young develop from desiccated eggs in the dried mud at the beginning of the rains. They take 6 to 8 weeks to become full-grown. They are voracious feeders. Once adult the female lays from 20 to 100 eggs a day for the rest of her life which may be till the pool dries up. The eggs take 60 to 70 days to hatch unless they become desiccated. Desiccated eggs begin developing immediately they are reimmersed in water. Adults prey upon their young as do adult *Gambusia*. *Nothobranchius* stand a range of temperature from 50 to 105°F.

Three species of *Barbus* have been investigated, *B. tentensis*, *B. sinuatus* and a new species discovered by the author. The maximum length of the first named is $2\frac{1}{2}$ in. of the other two 2 in. They are indigenous to rivers and stagnant pools in East Africa. They eat greedily all mosquito larvae offered to them but they are not primarily "live-feeders" as are *Nothobranchius*. Nothing is known of their breeding habits. They reappear in streams and rivers that completely dry up during the dry season.

Pachypanchax playfairi is found along the East African coast in stagnant waters and small streams. It prefers mosquito larvae to other foods. Its maximum length is $3\frac{1}{2}$ in. N W

BECKMAN (Haiti) An Experimentally Derived Method for Determining the Degree of Infection in Avian Malaria.—*Amer. J. Trop. Med.* 1941 Jan Vol 21 No 1 pp 151-157 With 5 figs

The study of the blood of canaries infected with *Plasmodium cathemerium* has led the author to adopt a method of recording the intensity of infections based on the time occupied in counting twenty parasites in thin blood films. A time limit of three minutes is arbitrarily chosen. A negative record indicates that no parasites were seen in a three minutes search while a 1+ means that less than twenty were seen in the same time. A 2+ is recorded when the twenty parasites are seen in 2-3 minutes, 3+ when seen in 1-2 minutes, 4+ in half to one minute and 5+ in half a minute or less. The author has used the method in his experimental work and finds it reliable for determining the degree of infection upon a comparative basis.

C. M. Wenyon.

JACOBI (Ludolf) Zur Biologie und Pathologie des Plasmodium Gallinaeum (Brumpt) [Biology and Pathology of *P. gallinaeum* —*Arch. f. Experim. Path. u. Pharm.* 1940 Dec. 12. Vol 196 No 6 pp 623-643 With 2 figs. [27 refs.]

In a study of *Plasmodium gallinaeum* the author has shown that parasites appear in the blood a few minutes after intramuscular inoculation of a fowl with infected blood from another fowl. Similarly parasites appear in the blood immediately after intravenous injection of a much smaller dose and most of the parasites thus injected continue their development. Nevertheless, the older the parasites injected, particularly when approaching schizogony the greater is the number which continues the development. Two-hourly blood examinations showed that there is no clear-cut cycle of development. At most only 70 per cent of the parasites were in any one stage of development at any moment. Chronically infected birds reveal a marked immunity to superinfection. Of 32 birds inoculated intravenously only 5 showed any development of the parasites introduced, and in not one of these did the development lead to an acute infection, as is always the case with birds not previously infected. Birds which have clinically recovered still harbour parasites for at least $1\frac{1}{2}$ years as shown by the fact that 0.05 cc of blood will infect new birds. As regards exoerythrocytic schizonts, these could not be found in superinfected birds between the 10th and 74th days, even after intravenous injections of heavy doses of parasites. Heavily infected blood in citrate solution

retains its infectivity for four days at laboratory temperature but there is during this period a continual death of the parasites. The plasma from this citrated blood loses its infectivity in 24 hours but if blood from a healthy fowl is added to it its infectivity is not lost in this period. In this case it cannot be supposed that the survival is due to the protection afforded by a host cell. C M W

BELTRAN (Enrique) & LARENAS (Radl) El ciclo esquizogónico en *Plasmodium gallinaceum* Brumpt. [Schizogony Cycle in *P. gallinaceum*].—*Rev Inst de Salubridad y Enfermedad Trop Mexico* 1940 Dec. Vol 1 No 4 pp 291-309 With 4 graphs [14 refs.] English summary (8 lines)

A study of the schizogony cycle in *Plasmodium gallinaceum* has shown that this occupies from 36 to 42 hours. There is a high degree of synchronicity the majority of the parasites reaching maturity at one time. There is however considerable variation in this respect from bird to bird. Though there was a notable mortality of all stages of the parasite from the merozoite to the mature schizont this was not so marked as that reported for certain other malarial parasites of birds. C M W

TERZIAN (L. A.) Studies on *Plasmodium lophurae* a Malarial Parasite in Fowls. I Biological Characteristics.—*Amer J Hyg* 1941 Jan Vol 33 No 1 Sect. C pp 1-22. With 2 figs [10 refs]

The author has carried out a biological study of *Plasmodium lophurae*, the malarial parasite of a Borneo fireback pheasant which was inoculated by COGGESHALL to young chicks. To maintain the parasite satisfactorily in chicks intravenous inoculations of at least 50 000 parasites must be made and transfers are best made every five or six days. Parasites remain in the blood for five to fourteen days. Three or four days after parasites disappear from the blood this is no longer infective to fresh chicks though it has been shown that parasites are still present. The numbers are too low to bring about visible infections in new chicks inoculated with the blood. The length of the asexual cycle has been shown to be 48 hours but the actual schizogony cycle occurs continuously over a period of 12 hours the synchronicity being low. The gametocytes appeared in the blood at the same time as the asexual forms and increased in number from day to day in the same relative proportion to the asexual forms. The gametocytes occupied 48 hours to grow to maturity and they were destroyed a few hours after this. There was little destruction of merozoites the majority of which successfully invaded red blood corpuscles. The destruction of the asexual stages occurred at a later stage of growth when no doubt the infected red cell had been sufficiently altered to render it susceptible to phagocytosis. A study of the internal organs showed that the parasites were not present in any greater concentration than they were in the peripheral blood. No evidence of exoerythrocytic schizogony was obtained.

C M W

RIVERO (María de los Dolores) & RAMIREZ (Elisao). La infección por el *Haemoproteus columbas* en la investigación de la actividad antimalárica. [Infection by *H. columbas* for testing Antimalarial Efficiency].—*Rev. Inst. Salubridad y Enfermedad Trop. Mexico* 1940 Sept. Vol. 1 No. 3. pp. 245-264. With 14 figs. [14 refs.]

The authors describe the life cycle of *Haemoproteus columbas* of the pigeon and advocate the use of this parasite as a means of testing antimalarial drugs. They show that the gametocidal action of plasmoquine and the schizonticidal action of quinine are exemplified by the influence they have on the life cycle of the parasite of the pigeon just as they have been shown to have on *Plasmodium cathemerium* infections in the canary. It has been possible to demonstrate that extracts of the bark of *Cordia latiflora* which is popularly regarded as a remedy for malaria, has no effect on the life cycle of *H. columbas* when administered to infected pigeons.

C M IV

LEISHMANIASIS.

PRECIS OF ABSTRACTS IN THIS SECTION

Visceral. CLOW (p. 569) reports that kala azar is widespread in the Shensi province of China. He discusses diagnosis and treatment. Cancer of the spleen has been noted as a complication in a number of cases.

CHUNG and LI (p. 570) produce further evidence which favours the view that human kala azar in the region of Peiping is closely bound up with the disease in dogs. GALLIARD (p. 570) discusses the view expressed by CHUNG that dogs are reservoirs of kala azar in Peiping, and points out that, though in the legations quarter of the city canine kala azar is common, cases of human disease there are rare.

AJELLO (p. 570) from a study of canine leishmaniasis, concludes that the cutaneous lesions are part of a general invasion of the reticulo-endothelial system, which affects also the internal organs. HO *et al* (p. 571) describe the diagnosis of canine kala azar by means of iliac puncture. MELLO (p. 571) reports a natural infection of a cat with a species of leishmania in Brazil.

PAI and HU (p. 571) report failure to cultivate *Leishmania donovani* in tissue culture.

CHU and ZIA (p. 572) show that after intratesticular inoculation of hamsters with *L. donovani* the parasites can be readily demonstrated five days later by testicular puncture.

PARAENSE and CHAGAS (p. 572) have shown that *Phlebotomus longipalpis* and *P. intermedius* may become naturally infected with the parasites of S. American visceral leishmaniasis.

DAVIES and WINGFIELD (p. 572) confirm the work of KIRK and SART on the value of gland puncture in diagnosis. They report a case of agranulocytosis occurring in a patient who had received 2.6 gm. of neostibosan. Injection of adrenalin produced improvement and the patient recovered. ANDREU UREA *et al* (p. 573) advocate sternal puncture in diagnosis.

COOK (p 573) reports a case in an Indian seaman admitted to hospital in New Zealand

KIRK and SATI (p 573) report further experiences with certain aromatic diamidines in the treatment of kala azar in the Sudan The results were eminently satisfactory even in the presence of complications such as cancrum oris and even when treatment with antimonials had failed Details of dosage are given NAPIER and SEN (p 574) report that diamidino-stilbene appears to be an effective therapeutic agent in the treatment of kala azar and give details of the dosage they employ Unpleasant effects are sometimes produced but may be relieved by the injection of adrenalin

WANG and CHUNG (p 575) produce evidence which suggests that hamsters cured of infection with *L. donovani* by treatment with neostibosan are immune to reinfection

Cutaneous and muco-cutaneous SALLAM (p 575) describes the clinical features of oriental sore in Egypt tartar emetic either injected or as an ointment, is very useful in treatment

SENEKJI and BEATTIE (p 576) have infected 200 persons with suspensions of *L. tropica* in Bagdad In each case a sore was produced and though reinfection was possible if attempted before the healing of the primary sore it could not be effected once healing was complete TEMPLETON (p 576) reports a case of oriental sore experimentally produced

ORSINI (p 576) points out that leishmaniasis is becoming an urgent problem in Minas Geraes and that in the majority of cases mixed mucosal and cutaneous lesions are found

For the skin lesions of American leishmaniasis MAZZA and CORNEJO (p 577) have found local infiltration with atabrin solution and atabrin by the mouth to be a very satisfactory treatment C IV

CLOW (J Ménières) Shensi Province as an Endemic Focus of Kala-Azar A Preliminary Report.—*Chinese Med J* 1941 Feb Vol 59 No 2 pp 150-155

Kala azar appears to be widespread in the Shensi province of China judging from the records of the Jenkins Robertson Memorial Hospital at Sian In March 1940 a special clinic for cases of this disease was started at the hospital and by November 196 cases (93 per cent. diagnosed by the finding of leishmania) had been dealt with Of the first hundred cases 68 were from the province of Shensi itself and all of these except about twenty were in children who had never left the area The thirty odd cases from outside provinces were mostly in adults A list of the villages from which the cases came is given For diagnosis sternal puncture is advocated in preference to spleen or liver puncture Treatment was carried out by intravenous injections of neostam or ureastibamine thrice weekly It is stated that vomiting is common with neostam while anaphylactic shock was seen four times with ureastibamine Of complications cancrum oris was noted in 14 cases either before or during treatment The mortality from this complication was about 64 per cent The records of the treated cases are not entirely satisfactory It is evident that the province of Shensi in which the incidence of the disease must be very high affords an excellent opportunity for an investigation of the epidemiology of kala azar C M Wenyon

CHUNG (Hui Lan) & Li (T. C.). The Occurrences of Canine Leishmaniasis in Kala Azar Villages in the Suburbs of Peiping.—*Chinese Med. J.* 1940 Dec. Vol. 53, No. 6, pp. 661-670. With 1 map.

In an earlier paper this Bulletin 1941 Vol. 38, p. 252] attention was called to the close relationship between human and canine kala azar in Peiping. There was strong presumptive evidence that the dog was actually a reservoir of the virus. In the present paper the authors produce further evidence derived from a study of the relationship in three villages near Peiping—namely Huiwang, Chengfu and Huiwen. All these places have been known to be endemic centres of the human disease and in the first of them all the cases in the village were discovered and treated in 1937 in the hope that this would stamp out the disease. Cases however continued to occur. When the results of the distribution of canine kala azar in Peiping had yielded such significant results this was extended to the three villages mentioned. Here again the disease was found to be common in dogs. At Huiwang 5 out of 63 at Chengfu 8 out of 16, and at Huiwen 6 out of 12 dogs were found infected. At the two first mentioned places there was a very close association of the canine and human kala azar. At Huiwen a much larger place it was not possible to draw any definite conclusions. It is suggested that the persistence of the human disease in Huiwang after 1937 was due to the continued presence there of the canine disease.

GALLIARD (H). A propos du kala-azar humain à Peiping. [Human Kala Azar in Peiping. —*Chinese Med. J.* 1941 Feb Vol. 59 No. 2 pp. 156-157.]

The author refers to a paper by CHUNG (this Bulletin 1941 Vol. 38 p. 252) on the relationship between human and canine kala azar in Peiping. Chung's conclusion was that the relationship is so close that there is reason to believe that, as in the Mediterranean areas of infection the dog of Peiping are reservoirs of the virus. The author points out that though in the legations quarter of the city canine kala azar is common cases of the human disease there are rare. There appear to be records of only three. The first was that of a German soldier who died after return to Germany in 1900 the second was of a French soldier diagnosed in Strasbourg in 1925 and the third of the child of a Japanese diplomat. The author recalls that he and BURNETT this Bulletin 1935 Vol. 32, p. 496] described experiments with the virus obtained from the case of the Frenchman in which they demonstrated the susceptibility to inoculation of the European spermophile (*Citellus citellus*) and the Palestinian hamster (*Cricetus auratus*). C. M. J.

AJELLO (P). Contributo allo studio delle ulcere cutanee nella leishmaniosi del cane. [Study of Skin Lesions in Canine Leishmaniasis. —*Atenei Ercol.* 1939 Vol. 44, pp. 281-300.] Summary taken from *At. Bull.* 1941 July Vol. 11 No. 7 p. 436. Initialed [F. R.]

Histological investigations were carried out on 14 cases of cutaneous leishmaniasis of dogs to ascertain the nature of the lesion and the

relationship between cutaneous and visceral leishmaniasis. It is pointed out that leishmanial ulcers are indistinguishable macroscopically from traumatic or trophic ulcers that they are often the only symptom of leishmaniasis observed, and that they usually occur on skin areas exposed to trauma. In dogs the ulcer is not preceded by a nodule as in human beings.

In all the cases under investigation visceral leishmaniasis was found to be present. The essential lesion appears to be an invasion of the lower layers of the skin with histiocytes combined with degeneration and necrosis of the epidermal cells. It is concluded that cutaneous canine leishmaniasis is not a separate entity but that the parasites with their predilection for reticulo-histiocytic tissue invade the skin and internal organs with equal readiness.

HO (E. A.) CHU (H. J.) & YUAN (I. C.) *Ilium Puncture, a Simple Method for obtaining Bone Marrow from Dog—Chinese Med J* 1940 Dec. Vol. 58 No 6 pp 679-681 With 2 plates.

For the diagnosis of kala azar in dogs the authors who have had experience in North China, advocate ilium puncture. This is carried out by use of a short intravenous injection needle fitted with a stylet. The dog is placed on its side and the needle is passed in an antero-posterior direction through the skin and muscles till it impinges on the ilium just behind the crest. It is then bored through the outer lamina of the bone till a yield in resistance indicates entry into the spongy bone of the marrow cavity. The stylet is then withdrawn and, with an ordinary 20 cc. syringe fitted to the needle, bone marrow is sucked up. It has been found that the method is applicable to cats and rabbits.

C M W

MELLO (G. Britto) *Verificação da infecção natural do gato (Felis domesticus) por um protozoário do genero Leishmania. [Natural Infection of a Cat with Leishmania sp.]—Brasil Medico* 1940 Mar 23 Vol. 54 No 12. p 180

In the district of Aurá about thirty kilometres from Pará, a cat was discovered suffering from ulceration of the ears and nose. Examination of smears revealed what appeared to be leishmania. It was realized that these might be leishmania stages of *Trypanosoma cruzi* so a number of detailed examinations were carried out. Blood smears failed to reveal trypanosomes while leptomonads developed in culture media inoculated from the sores. Sections of tissue showed distribution of leishmania in mononuclear cells. Bugs (*Triatoma brasiliensis*) fed on the sores acquired only a transitory leptomonas infection. This and other tests indicated that the parasite was of the genus *Leishmania* but whether *L. brasiliensis* or *L. chagasi* could not be determined.

C M W

PAI (H. C.) & HU (C. H.) *Attempts to grow Leishmania donovani in Tissue Cultures.—Proc Soc Experim Biol & Med* 1941 Apr Vol. 46 No 4 pp 606-608. With 2 figs.

Attempts to grow *Leishmania donovani* were made in cultures of chicken hamster and human tissues. It was found that the parasites were taken up by the phagocytes within 24 hours. In the hanging drop cultures parasites were all degenerated by the 15th day. In the

slowly growing cultures in flasks prepared according to Fischer and Parker's method they were all degenerated by the 43rd day. Multiplication of the parasites has not been observed. "It is concluded that the parasites may survive for various lengths of time but cannot grow in the tissue cultures according to the methods described and that the length of survival is in inverse ratio with the rapidity of the growth of the tissue cultures."

CHU (H. J.) & ZIA (Samuel H.) *Leishmania Infection of Hamsters and Rabbits by the Intratesticular Route.*—*Chinese Med J* 1940. Dec. Vol 58 No 6 pp 677-678

The authors have found that Chinese hamsters can easily be infected with *Leishmania donovani* by intratesticular inoculation. The presence of parasites can readily be detected by testicular puncture sometimes as early as the fifth day. Systemic involvement can be demonstrated within two weeks of inoculation. It was shown that a local infection lasting for one month followed intratesticular inoculation of the otherwise resistant rabbit.

C. M. H.

PARAENSE (L.) & CHAGAS (A. W.) *Transmissão experimental da leishmaniose visceral americana pelo Phlebotomus intermedicus*. Nota prévia. "Experimental Transmission of American Visceral Leishmaniasis by *P. intermedicus*."—*Brasil Medico* 1940. Mar 23 Vol 34 No 12 pp 179-180. With 2 figs.

It has already been shown in South America that sandflies (*Phlebotomus longipalpis* and *P. intermedicus*) become infected with the parasite when fed on a dog suffering from kala azar. To obtain the parasite in the sandflies were actually derived from the blood of a human being infected with the disease. The sandflies were then inoculated intraperitoneally into hamsters (*Cricetus cricetus*). Of two hamsters subjected to several such injections one developed a generalized leishmanian infection.

C. M. H.

DAVIS, ARTHUR & WINGFIELD (Alec) *Agranulocytosis in Kala Azar and Use of Adrenalin.*—*Trans Roy Soc Trop Med & Hyg* 1941. May 27 Vol 34 No 6 pp 421-428 [23 refs]

In describing a case of kala azar in an Indian seaman in London, where the complication of agranulocytosis occurred, the procedure of diagnosis by gland puncture as compared with spleen, liver and sternum puncture is discussed. The authors point out that in a limited series of cases in which they have carried out puncture of lymphatic glands they have been uniformly successful in finding leishmaniasis by this means. A recommendation by HARK and SATI (this Bulletin 1940 Vol 33 p 71) that the glands most easily dealt with are those of the lower superficial inguinal group. The gland selected is immobilized between the finger and thumb and punctured with a dry needle into which the gland fluid readily passes. The fluid is then blown on to a slide for film making.

The case of kala azar reported is exceptional in that after the administration of 2-6 grammes of neostibosan in twelve days during which the temperature fell and improvement occurred, the complication of agranulocytosis supervened. The temperature rose and the blood showed severe granulocytopenia. Treatment with nucleinic

acid intravenously pentnucleotide intramuscularly and blood transfusion was carried out with little improvement Adrenalin [presumably 1 in 1 000] 15 minims was injected subcutaneously This produced an increase in the white cell count In view of this response adrenalin was given frequently during the next week Complete recovery occurred No further antimony treatment was required as it appeared that the attack of agranulocytosis had had a curative action on the kala azar

C M W

ANDREU URRA (J) REGLI (E) & ANDREU URRA (F) La medula ósea en el kala-azar del adulto [The Bone Marrow in Kala Azar of the Adult.]—*Rev Clin Española* Madrid. 1940 July 1 Vol 1 No 1 pp 25-28 With 8 figs. [15 refs.] French summary p 27

Writing of kala azar in Spain the authors advocate sternal puncture as a diagnostic procedure preferable to other methods It is stated that the presence of undoubted leishmania within red blood corpuscles indicates the existence of a developmental cycle in these cells The microphotographs purporting to illustrate this are however quite unconvincing

The bone marrow changes brought about by the infection indicate a regenerative reaction of the normoblastic type and an inhibition of the myeloid cells. [See also this *Bulletin* 1939 Vol 36 p 1030 1940 Vol 37 pp 349 772 877]

C M W

COOK (A Bramwell) Kala-Azar Report of a Case in New Zealand. —*New Zealand Med J* 1941 Feb Vol. 40 No 215 pp 53-54

The case reported is that of an Indian seaman from Calcutta who was admitted to hospital in New Zealand for fever associated with enlargement of the spleen Kala azar was suspected and leishmania were demonstrated by splenic puncture. The case is reported in order to call attention to the possible occurrence of the disease in lascars who may be invalided in New Zealand The case responded well to intravenous injections of tartar emetic

C M W

KIRK (R.) & SATI (Mohammed Hamad) The Use of Certain Aromatic Diamidines in the Treatment of Kala-Azar—*Ann Trop Med & Parasit* 1940 Dec. 31 Vol 34 Nos 3 & 4 pp 181-197 With 1 fig [20 refs.]

In a previous paper the authors referred to 28 cases of kala azar in the Sudan which were treated with 4 4'-diamidino stilbene [see this *Bulletin* 1941 Vol. 38 p 260] Details of 8 of these cases were given. Two had died and six had remained in good health for four months after discharge from hospital It is now pointed out that the six cases are still in good health after a further two months observation In the previous paper it was noted that the treatment of the remaining 20 cases had not then been completed. It is now stated that of these 20 patients two died while the remaining 18 have remained in good health for periods up to 6-7 months. This result is eminently satisfactory when it is realized that in the majority of cases one or more of the usual complications, including cancrum oris occurred. One additional case is mentioned in which two courses of

neostibosan and three of tartar emetic failed to bring about a cure. When the diamidino stilbene was administered an immediate response followed by apparently complete recovery occurred. A series of 13 cases were treated with an allied drug 4-4-diamidino diphenoxy pentane in the same doses and by the same method of administration [see also this Bulletin 1941, Vol. 28 p. 261]. There were three deaths nine immediate recoveries and one doubtful recovery. A further two cases were treated with another drug 4-4-diamidino diphenoxy propane. Of these one died and the other recovered.

In all the above cases with one exception in which intramuscular administration was employed, the drugs were given intravenously in a solution of 10 mgm in 10 cc of distilled water. The individual doses varied from 1 to 2.6 mgm and the total quantity administered from 0.75-4.9 gm. With these drugs minor toxic symptoms were not infrequently observed but in two cases treated with 4-4-diamidino diphenoxy pentane the toxic symptoms were serious. Nevertheless administration of the drug was continued in these cases with no further reactions. Of the 44 patients treated with one or other of these drugs 8 died but of these 5 were in *extrema* when brought to hospital for treatment. The number of cases is too low to admit of a comparison of the effectiveness of the drugs to be made. There is no doubt, however, that, compared with the results obtained in the Sudan by treatment with antimonials, the results with the new drugs are good. In a note to the paper by the Editors it is stated that the first author had sent information regarding the cure of two cases of espendia and two cases of antimony resistant kala azar by 4-4-diamidino stilbene.

C. V. H.

NAPIER (L. Everard) & SEX (G. N.) Diamidino-Stilbene in the Treatment of Kala-Azar—*Indian Med. Gaz.* 1940 Dec. Vol. 75 No. 12 pp. 720-725. With 3 charts.

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In the present paper further experiments along the same lines are described. Treatment in three sets of infected hamsters showed that a total dosage of 20 grammes of neostibosan per kilo of body weight produced an actual cure rate of only 47.1 per cent. The proof of cure was the failure to discover leishmania in smears of the organs and the failure of hamsters inoculated with emulsion of spleen and liver to become infected. The dosage of neostibosan used in these experiments was actually 400 times as large as the dosage per kilogramme required to bring about cure in about 90 per cent of human beings. As regards immunity after cure complete disappearance of parasites was proved by removal by biopsy of a portion of the spleen and inoculating this into hamsters. If these did not become infected it was concluded that absolute cure had occurred. Four such hamsters were re-inoculated. Two months later they were killed and inoculations of spleen and liver into other hamsters was made. The result was that the re inoculation had produced no infection in any of the four animals

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In all the above cases, with one exception in which intramuscular administration was employed, the drugs were given intravenously in a solution of 10 mgm in 10 cc of distilled water. The individual doses varied from 1 to 2.0 mgm and the total quantity administered from 0.75-4.0 gm. With these drugs minor toxic symptoms were not infrequently observed but in two cases treated with 4-4-diamidino diphenoxy pentane the toxic symptoms were serious. Nevertheless administration of the drug was continued in these cases with no further reactions. Of the 44 patients treated with one or other of these drugs, 8 died, but of these 6 were *in extremis* when brought to hospital for treatment. The number of cases is too low to admit of a comparison of the effectiveness of the drugs to be made. There is no doubt, however, that, compared with the results obtained in the Sudan by treatment with antimonials, the results with the new drugs are good. In a note to the paper by the Editors it is stated that the first author had sent information regarding the cure of two cases of *espondia* and two cases of antimony resistant *kala azar* by 4-4-diamidino stilbene.

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may be so severe as to cause deformities, especially near joints such as the elbow. In old neglected cases massive warty growths may occur—the verrucose type of Ferguson and Richards. Most of the cases respond quickly to tartar emetic, the course being 20 intravenous injections of 2 grains each. A 1 per cent. tartar emetic ointment in vaseline may be extremely useful. C M W

SENKESJI (H A) & BEATTIE (C P) Artificial Infection and Immunization of Man with Cultures of *Leishmania tropica*—*Trans Roy Soc Trop Med & Hyg* 1941 May 27 Vol. 34 No. 6. pp. 415-419

The authors describe the results of the inoculation of 227 persons in Bagdad with suspensions of the cultural forms of *Leishmania tropica* with the object of producing a protective immunity. The inoculum was arranged to contain twenty million leptomonads per cc. and a dose of 0.15 cc. was given intracutaneously to each individual on the front of the thigh. Of 200 cases which it was possible to follow 198 developed oriental sore at the site of inoculation in an average of two to four weeks in adults and about 2 months in children. The two cases which failed to respond to the first injection responded to a second. It was also shown that a second injection had healed on cases before the sore resulting from the first inoculation had healed developed a second sore. A similar result was obtained by the inoculation of persons with an unhealed naturally contracted sore. On the other hand, no sore developed in persons inoculated after complete healing had taken place. The high percentage of positive results is attributed by the authors to the carrying out of the inoculations intracutaneously with rich suspensions of flagellates. Both young and old cultures were employed and both gave equally good result. C M W

TEMPLETON (H J) Cutaneous Leishmaniasis, Experimentally Produced.—*Calif J Med & Western Med* 1941 Feb. Vol. 54 No. 2 pp. 70-71 With 2 figs

The case reported is that of a woman who went to the U.S.A. from Beirut Syria where Dr Berberian had inoculated her in the skin of the thigh with cultures of *Leishmania tropica*. Four months after inoculation a papule developed. This increased in size and finally broke down to form an ulcer measuring about one inch by half an inch. Healing eventually occurred, the total duration being seventeen months. Dr Berberian has for some time practised protective inoculations in Beirut this *Bulletin* 1939 Vol. 38 p. 1035. C M W

OZSINI (Olymbio) Leishmaniose em Minas Geraes. *Leishmaniasis in Minas Geraes*.—*Brasil Medico* 1940 Nov 16 Vol. 54 No. 46 pp. 762-768 With 1 chart 19 refs

Muco-cutaneous leishmaniasis is a problem of increasing importance in Minas, Brazil and is one which urgently demands the attention of the Director of Public Health. In the north-east particularly the incidence is so high that it constitutes a veritable calamity. From 1915 to 1939 at the hospital in Belo Horizonte 238 cases were seen

Of these 223 were in men and 15 in women. The ages of the patients varied from 10 years to 101 years the greatest incidence being in the age period 25 to 45. The duration of the disease in the cases coming to hospital varied from four months to four years. Though in some of the cases there were only cutaneous lesions in the majority there was a mixed mucosal and cutaneous infection. In Minas the district most involved is in the north-east along the Rio Doce but cases occur in all parts of the province. It would appear that the disease entered Brazil from Peru and Bolivia. Bahia and São Paulo were first invaded the disease spreading finally to Minas where it is at present a serious economic problem. C M II

MAZZA (Salvador) & CORNEJO (Andres) Ensayos de atebrina en leishmaniosis tegumentaria americana. [Atebrin Trials in American Cutaneous Leishmaniasis]—*Prensa Méd Argentina* 1940 Aug 21 Vol. 27 No 34 7 pp With 2 figs.

Seeing the announcement of FLARER of Catania that oriental sore was curable by the infiltration of the lesion with solutions of atebtrin [see this *Bulletin* 1939 Vol. 36 p 454] the authors have tried the treatment in a case of S. American leishmaniasis in which a single sore alone existed. Infiltration of the sore was carried out with 5 cc. of a 10 per cent. solution of atebtrin and at the same time three tablets were given orally each day for seven days. Complete healing of the sore had occurred in fifteen days. The good result of this treatment of the cutaneous lesions was not obtained when atebtrin was employed for mucosal lesions which failed to respond. For them combined foudadin and yatren medication remains the best. C M IV

CHOLERA

PRÉCIS OF ABSTRACTS IN THIS SECTION

In the Annual Report of the Eastern Bureau of the League of Nations (p 578) it is stated that the mortality from cholera in British India has shown a tendency to decline in the last 30 years but that there is now a tendency for cholera to persist in inter-epidemic periods. It is generally accepted that high relative humidity with high temperature and intermittent rain provides the most suitable conditions for the development of epidemics. MAKAND (p 579) gives information on the epidemiology of cholera in the Central Provinces of India, and in Berar.

HUANG *et al* (p 579) give details of the preparation of agar medium for the growth of *V. cholerae* in which previously used agar is employed after being washed to eliminate growth inhibiting substances remaining from previous cultures. PASRICHA *et al* (p 580) have shown that if faeces are highly diluted before plating more numerous colonies of pathogenic organisms are obtained than by any direct plating method.

LINTON (p 580) discusses the complex subject of the identification chemical composition sugar reactions haemolytic action and antigenic reactive properties of *V. cholerae* concluding that further study is called for.

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MAZZA (Salvador) & CORNEJO (Andres) Ensayos de atebrina en leishmaniosis tegumentaria americana [Atebrin Trials in American Cutaneous Leishmaniasis].—*Prensa Méd Argentina* 1940 Aug 21 Vol 27 No 34 7 pp With 2 figs.

Seeing the announcement of FLARER of Catania that oriental sore was curable by the infiltration of the lesion with solutions of atebtrin [see this *Bulletin* 1939 Vol. 36 p 454] the authors have tried the treatment in a case of S. American leishmaniasis in which a single sore alone existed. Infiltration of the sore was carried out with 5 cc. of a 10 per cent. solution of atebtrin and at the same time three tablets were given orally each day for seven days. Complete healing of the sore had occurred in fifteen days. The good result of this treatment of the cutaneous lesions was not obtained when atebtrin was employed for mucosal lesions which failed to respond. For them combined foudadin and yatren medication remains the best. C M W

CHOLERA

PRÉCIS OF ABSTRACTS IN THIS SECTION

In the Annual Report of the Eastern Bureau of the League of Nations (p 578) it is stated that the mortality from cholera in British India has shown a tendency to decline in the last 30 years but that there is now a tendency for cholera to persist in inter-epidemic periods. It is generally accepted that high relative humidity with high temperature and intermittent rain provides the most suitable conditions for the development of epidemics. MAKAND (p 579) gives information on the epidemiology of cholera in the Central Provinces of India and in Berar.

HUANG *et al* (p 579) give details of the preparation of agar medium for the growth of *V. cholerae* in which previously used agar is employed after being washed to eliminate growth-inhibiting substances remaining from previous cultures. PASRICHA *et al* (p 580) have shown that if faeces are highly diluted before plating more numerous colonies of pathogenic organisms are obtained than by any direct plating method.

LINTON (p 580) discusses the complex subject of the identification chemical composition sugar reactions, haemolytic action and antigenic reactive properties of *V. cholerae* concluding that further study is called for.

BASU *et al* (p 581) have studied the substances which diffuse into a cellophane bag containing sterile salt solution and immersed in a fluid culture of *V. cholerae* for 5 days.

CHATTERJEE (p 582) discusses the histopathological changes in the kidney in cholera. He ascribes to a histamine-like substance most of the congestive changes found and considers that the morphological changes are probably in some way connected with a hypersensitive state in the course of an infection.

MALIK and PARIKH (p 582) describe methods for estimating the chemical constituents of small quantities of blood in cholera. They (p 583) give the results of their investigations by this method, pointing out the resemblance between this condition and that of shock.

CHATTERJEE and SARKAR (p 583) discuss the chemical composition of the blood in the condition of dehydration which occurs in cholera. FOLDES (p 583) gives details of a glass vessel used with varying proportions of chloroform and benzene to determine the specific gravity of blood and body fluids.

GHOSH and CHAKRABORTY (p 585) have determined the chemical composition of the stools of cholera patients. All are highly alkaline and a disturbance of osmotic balance to which may be due the suppression of urine which occurs.

YING (p 585) has found as a result of an investigation of 200 cases of cholera that although in 88 per cent the date of the last positive culture is two weeks after the onset of the disease there are a few cases in which positive cultures may be obtained in the fourth week. Generally speaking cholera patients should be isolated for two weeks from the onset or for at least one week from the beginning of convalescence.

HUTCHER and SCRIBNER (p 588) have written a review of the literature on bacteriophage.

CATALI (p 588) describes an agar liquefying vibrio isolated from acts at d Judge C IV

LEAGUE OF NATIONS HEALTH ORGANISATION EASTERN BUREAU
SINGAPORE ANNUAL REPORT FOR 1940 PP 37-54 With
16 graphs & 2 maps—(D) Cholera (General) (E) Cholera in
Countries. (F) Cholera in Sea and Air Ports.

The report treats the subject of cholera under the three headings General cholera in countries and cholera in sea and air ports.

(A) Cholera (General)—Endemic foci of cholera are being established for China as well as for British India. The National Health Administration of China put forward a scheme for the prevention and control of cholera epidemics which, with modifications, could be made to suit all tropical countries. This scheme is given in some detail.

(B) Cholera in countries—In British India, judging from the figures of five-year periods from 1910-1930 the tendency is for the epidemic to decline. Another tendency is noted, which is for succeed characteristics with freedom for the rest of the year. An El Tor epidemic in the island of Celebes has attracted much attention because the El Tor vibrio is not generally regarded as one giving rise to epidemics. It is mentioned in this report that during the period

16th June to 27th July a further eight (8) cases of El Tor infection were notified from Celebes of which five (5) were fatal. The high mortality of this infection resembles that of true cholera.

(C) *Cholera in sea and air ports*—It seems to be generally accepted that the association of high relative humidity with high temperature accompanied by intermittent rains represents the most favourable conditions for the development of the disease in epidemic form. What has been worked out for British India should apply generally to Eastern ports and enable public health authorities to make forecasts of probable epidemic prevalence W F Harvey

CENTRAL PROVINCES & BERAR. ANNUAL REPORT OF THE PUBLIC HEALTH DEPARTMENT FOR THE YEAR 1939 [MAKAND (S N), Director of Public Health] pp 15-17 With 1 chart—Cholera.

In the chapter on the epidemiology of cholera details are given district by district of the first cases of cholera for the season and some of the circumstances attending their appearance. Cases and deaths are all carefully recorded. Together with this annual and formal presentation there is published a useful graph of the seasonal rise and fall of cholera as shown by the number of recorded deaths month by month throughout the year. The peak numbers 335 479 and 361 are reached in the months August September and October respectively. Among the chief preventive measures taken were anticholera inoculations disinfection of wells or water supplies and distribution of Tomb's cholera mixture W F H

HUANG (Y W) SHEN (T H) & TANG (F F) A Note on the Re-Utilization of Used Agar-Agar as an Emergency Culture Medium.—*Chinese Med J* 1941 Feb Vol 59 No 2. pp 176-178 [Summary appears also in *Bulletin of Hygiene*]

Agar-agar is an extract of the seaweed *Gelidium corneum* and under present circumstances it is not easy to obtain supplies. The authors have experimented to find out whether it could not be used more than once. Their investigations led them to conclude that poor growths or failure of bacteria to grow on used medium sterilized were due not so much to lack of growth promoting material as to inhibiting substances left over from previous cultivation. They therefore cut the used and resolidified agar into thin slices placed them in covered bamboo baskets and the baskets into a running stream for 24-48 hours for thorough washing. Better results were thereby obtained but repeated autoclaving—14 or 15 lb pressure sterilizations—gradually removes the property of solidifying on cooling but by the addition of fresh agar 1 part to 2 of washed agar this was overcome. The authors now use the following formula—

Washed agar agar (3 per cent)	8 000 gm (containing 240 gm
Fresh agar agar	120 gm dry agar)
Sodium chloride	40 gm
Sodium carbonate	25 gm
Liver digest broth	2,000 cc.
Meat infusion broth	2 000 cc.

Sodium carbonate was added to neutralize the acidity which is apt to run very high after the agar was washed. Liver digest and meat infusion broth were used to supply peptone and other essential factors

Repeated growth of the enterica group and of *V. cholerae* has been obtained on this, without the production of any recognizable change in morphology cultural characteristics serological reactions or colony formation. It is good as an emergency medium for producing vaccines. H H S

PARRICKA (C L.) PANJA (G) & PAUL (B M) A Dilution Method for the Isolation of Pathogenic Bacteria from Faeces.—*Indian Jl Med Res* 1940 Oct Vol 28 No 2 pp 323-325

By dilution of a stool before plating more numerous colonies of the pathogenic organisms sought for were obtained than by any direct plating method. The exact dilution to be used is determined by experience and it was found to be much better to make the first dilution with half or one cubic centimetre of stool than with small quantities such as loopfuls. A suspension is made of 0.5 cc stool in 4.5 cc broth or in sterilized tap water of pH 7.4 and from this 10-fold dilution further 10-fold dilutions are made up to 1 in 100 000 000 or more. From the 4 highest dilutions amounts of 0.5 cc. are plated immediately after preparation in 5-inch Petri dishes. The inoculum is spread by a combination of rotary and tilting movement.

As explanation of the better results obtained by dilution it is suggested that either other bacteria exert an inhibiting influence on the pathogenic organisms which is diminished by good separation of colonies or the clumps of the pathogenic organisms are broken up in the course of dilution to give more numerous separate colonies. The latter explanation is the one preferred. Results obtained indicate that this method is of considerable value in the isolation of pathogenic bacteria. H F H

LIXTON (R W) The Chemistry and Serology of the Vibrios.—*Bact. Reviews* 1940 Dec Vol 4 No 4 pp 281-319 [160 refs.]

This review deals critically and controversially with the subject of the so-called true cholera vibrio and the vibrio group in general. Obviously we are mainly concerned with deciding which vibrio is pathogenic. By a series of steps it may be said that agreement has been reached to call that organism the true cholera vibrio which (1) ferments mannose and sucrose but not arabinose (2) does not haemolyse goat erythrocytes and (3) agglutinates with O-group I serum. But no single one of these characteristics suffices to pick out the cholera vibrio. It requires all three to do so with certainty. This seems to the author difficult to reconcile with the orthodox teaching that the cause of cholera is a distinct entity utterly unrelated to other vibrios. He himself would not insist on such complete separation of the vibrio-cause of cholera from vibrios of other groups. His own work is very well known and has resulted in finding a chemical composition for vibrios which when grouped gives six combinations only of 3 different carbohydrates and 2 proteins. One polysaccharide and one protein are commonly obtainable from each strain of vibrio and if exceptions to this rule occur it is invariably found that the strain is undergoing dissociation. Other authors have attacked the problem from their own particular point of view. Bruce White concluded that each type of vibrio growth (S, R, and ρ) had its own

characteristic complex of saccharides—in the S form α , β , γ , δ in the R form β , γ , δ and in the ρ form γ , δ . Type α was dominant in the smooth form β in the rough and δ in the rho and the loss of these dominant substances from the S and R forms led to the domination by another of the substances which was previously present but masked. Another attempt to classify vibrios is that of HEIBERG in which six groups also emerge according to power of producing acid in one or more of the sugars mannose, arabinose and sucrose.

The discovery of the haemolytic El Tor vibrio having serological identity with the non-haemolytic cholera vibrio is now an old story but has recurred as a problem in connexion with the investigation of new El Tor strains and the haemolytic epidemic strain known as *V. celebicus*. van LOGHEM described haemolytic action by *V. cholerae* as haemo digestion and not true haemolysis by an exotoxin. He posed the questions which are still unanswered. Can a non-haemolytic true vibrio become haemolytic? and can a haemolytic strain cause cholera?

A departure from pure chemical, fermentation and haemolytic characters is made with the resort to specific antigenic reactive properties and these are probably the most important of all for the differentiation of the possible vibrio pathogens. The scheme of GARDNER and VENKATRAMAN is almost universally adopted and depends on the definition of the cholera group as those vibrios which are biochemically and bacteriologically similar to *V. cholerae* and possess a common H antigen. The first subdivision of this group is the O-group I which yields (1) the non haemolytic (goat cells) cholera vibrios of original (Inaba) variant (Ogawa) and middle (Hikojima) types and (2) the haemolytic El Tor vibrios. The second subdivision of the main group includes O-groups II, III, IV, V, VI and individual races (mostly haemolytic) among which are found paracholera, cholera-like and some El Tor vibrios. The work of many other authors is taken up critically in this review which should be consulted for the detail. de MOOR came to the opinion that

Asiatic cholera should be considered a disease in the same sense as bacillary dysentery, in which the same or a very similar disease may be due to bacteriologically different organisms.

The author's own conclusions evidently tend towards the rejection of too rigidly selective a definition for the cholera vibrio and he calls for further study of the problem. The application of the concepts of somatic and flagellar antigens has defined rather than solved the problem of cholera etiology. The results obtained in the study of dissociation may prove of value when applied to epidemiology or it may be found that the variants are merely abnormalities produced in the laboratory. These larger problems as well as lesser ones in the study of haemolytic power, metabolism and toxigenicity urgently call for study to the end that cholera may be still further reduced and confined to its Asiatic home.

W F H

BASU (Charuchandra), CHAUDHURY (Anilkrishna) & BASU (Ramendranath). Study of Fluid Diffusates obtained by cultivating *Vibrio cholerae*. A Preliminary Note.—*Calcutta Med J* 1940 Sept. Vol. 37 No 9 pp 571–576 With 1 fig.

The dialysing apparatus used in these experiments consisted of a cellophane or collodion bag containing sterile salt solution immersed

in a growing culture of *V. cholerae*. The culture medium was a Difco proteose peptone solution of pH 7.8. After five days incubation the contents of the bag the diffusate were filtered through an L3 Chamberland candle and put through various tests to determine their nature. Intraperitoneal injection of the filtrate in doses of 5 cc. was well tolerated by the guinea-pig but a dose of 1 cc. in the rat was followed by restlessness, cramps, paresis and signs of imminent death. These remarkable symptoms in the rat lasted only 10 to 12 hours and the animal had completely recovered in 24 hours. The remaining tests of the diffusate were chemical and immunological. It "contains carbohydrate substances and practically no protein" "gives rise to agglutinin and precipitin in the blood of the rabbit and protects it against injection of lethal doses of *Vibrio cholerae*" it furnishes an antiserum which will prevent the development of the remarkable symptoms noted in the rat and is thermostable.

Neither chemical nor biological tests give any indication that the diffusate was a histamine-like substance. W F H

CHATTERJEE (Hemendra Nath) Histopathology of the Kidney in Cholera.—*Trans Roy Soc Trop Med & Hyg* 1941 Jan. 31 Vol. 34 No. 4 pp 333-342 With 3 figs on 2 plates. [44 refs.]

The histopathological changes in the kidney in cholera are surprisingly inconstant and inconspicuous. In this study 13 cases of cholera with uraemia and 25 cases without uraemia have been examined *post mortem*. As might be expected the changes in the non-uraemic kidneys are much less marked than in the uraemic. These changes are very shortly described as congestion of capillaries in glomeruli and medulla, swelling of the glomeruli so as to fill the capsule hyaline fibrillation of the basement membrane practically complete absence of the inflammatory cellular features of a glomerulonephritis. As the changes in the kidney are non-inflammatory it is not to be wondered at that recovery of renal function is complete if the cholera attack itself is recovered from. Most of the congestive change in the kidney is ascribed to the action of a histamine-like substance and the anuria to deficient blood pressure. Although it may be contended that cholera is too acute for the changes of glomerulonephritis to take place, the evidence according to the author tends to support the explanation that the morphological changes that occur in the kidney are in some way connected with a hypersensitive state in the course of an infection. W F H

MALIK (H. S.) & PARIKH (C. L.) The Blood in Cholera. Part I. Technical Methods.—*Indian J Med Res* 1940 Oct. Vol. 28 No. 2 pp 291-299

Methods are here described for estimating the chemical constituents with small quantities of cholera blood. The blood was oxalated with 3 mgm potassium oxalate for each cc. of blood and tubes were prepared with the dried oxalate to receive 4, 5 or 6 cc. of blood according to the circumstances of the case. It takes about 4 cc. blood to determine cell volume and fractional portions of a cubic centimetre for the other estimations. These other estimations were sugar haemoglobin,

moisture urea and chlorides of whole blood and sugar total non fibrin nitrogen globulin moisture chlorides non-protein nitrogen and inorganic phosphate of plasma. Detailed descriptions of the micro-methods are given
H F H

PASRICHA (C L.) & MALIK (K S) 'The Blood in Cholera. Part II. Certain Chemical Constituents.—*Indian J Med Res* 1940 Oct Vol. 28 No 2 pp 301-307

In this part of the investigation the results obtained by the methods described in the first part are given. Altogether 17 cholera patients all in the acute stage of the disease were examined before the administration of any saline transfusion. One patient died on the first day of the disease all the rest recovered rapidly. The records show wide variations in individual cases but suggest that in the acute stage of cholera there is (1) An increase in the cell volume (2) An increase in the haemoglobin percentage. This increase is directly correlated with the cell volume (3) A decrease in moisture content of the blood and plasma but this decrease is not marked in the acute stage of the disease (4) An appreciable increase in the urea and non protein nitrogen (5) An appreciable increase in the total plasma proteins fibrin and globulin fractions (6) An increase in the organic phosphates. (7) An appreciable increase in the glucose concentration in the blood and the plasma. (8) A diminution in the concentration of the sodium chloride in the blood and in the plasma but this diminution is not marked.
IV F H

CHATTERJEE (Hemendra Nath) & SARKAR (Jamini) Biochemical Study of the Blood of Cholera Patients.—*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol 34 No 5 pp 379-386 [27 refs.]

It must be remembered that in cholera there occurs a great concentration of the blood due to dehydration. In consequence of this it is essential not merely to study the chemical composition of the blood but also to consider the effect on this of the three factors the specific gravity of the blood, the total number of red cells and the corpuscular volume. The main findings in this research were (1) diminution of sodium content and increase in potassium content (2) lowering of serum calcium but increase during clinical improvement even without its therapeutic replacement (3) diminution of serum chloride but proportionately less than that of sodium (4) decrease in blood sugar in most cases (5) increase of urea and non-protein nitrogen

One of the most important features of cholera is acidosis and there is also increase of inorganic phosphates. Acidosis however is similarly found in shock with its marked decrease in alkali reserve. Other changes found in cholera as in the serum electrolytes and the hypoglycaemia have also been observed in shock.
IV F H

FÖLDES (Francis) A New Method for determining Specific Gravity of Blood and Body Fluids.—*J Lab & Clin Med* 1941 May Vol. 26 No 8 pp 1370-1373 With 2 figs.

The method is a modification of Hammerschlag's original method of determining the specific gravity of blood by means of a mixture of
(1486)
C

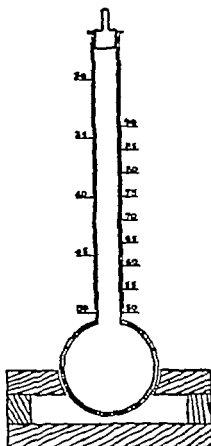


FIG. 1

[Reproduced from the *Journal of Laboratory and Clinical Medicine*

chloroform and benzene in which a drop of the blood floats at the centre. It depends on the use of a glass vessel which is bulbous below and cylindrical above [see figure]. The cylinder bears the base mark 1.050 close above the bulb and this represents the point to which 25 cc. of a chloroform-benzene mixture of this specific gravity is filled. Marks succeed one another from this point on the cylinder of 1.050 1.045 1.040 1.030 on the one side and 1.050 1.035 1.060 1.090 on the other. These points show the amount of rise of fluid in the gradation of the instrument according as benzene (S.G. 0.684) or chloroform (S.G. 1.476) is added to the 1.050 mixture to obtain the several specific gravities which must obviously fall in the one case and rise in the other. To use the instrument fluid of 1.050 specific gravity is filled to the 1.050 mark and a drop of blood is added to it with a teated pipette. If the specific gravity of the blood exceeds this figure the drop will sink and chloroform is added in small quantities until it comes to float at the centre of the mixture contained in the globular part of the vessel. If on the other hand the specific

gravity is less than 1.050 the drop will remain on the surface and it will be necessary to add benzene until it floats in the middle. In order to obtain graduations of the instrument 1.055 and 1.045 that is to say amounts of chloroform or benzene to be added to the original 25 cc of 1.050 specific gravity the two equations are used (1) $25 \times 1.050 + 1.476x = 1.055 \times (25 + x)$ and (2) $25 \times 1.050 + 0.884y = 1.045 \times (25 + y)$ respectively where x (chloroform) = 0.297 cc. and y (benzene) = 0.776 cc. With the necessary substitutions in the equations the volume additions for rising specific gravities 1.060 1.065 and falling specific gravities 1.040 1.035 may be calculated. Similar vessels may be prepared for other ranges of rising and falling specific gravities.

W F H

GHOSH (H) & CHAKRABORTY (R. K.) **Chemical Constituents of the Stool of Cholera Patients.**—*Indian Jl Med Res* 1940 Oct. Vol. 28 No 2 pp 309-313

All these experiments were made with fresh samples of stools and the methods of determination of the chemical constituents are given in some detail together with the data obtained from examination of 31 cases. The conclusions reached are that — All cholera stools are highly alkaline and it seems positive that alkaline reaction of the medium is distinctly favourable to the formation of cholera toxin. This is also corroborated by the fact that *Vibrio cholerae* grow abundantly in highly alkaline medium. Elimination of alkaline base and chlorides is also considerable. This leads to acidosis and disturbs the osmotic balance. The suppression of urine may be partially due to the disturbance of this osmotic balance.

W F H

YING (Y Y) **The Persistence of Vibrios in Cholera Patients. A Study of Two Hundred Cases.**—*Chinese Med Jl* 1940 Nov. Vol 58 No 5 pp 595-596

A large series of cases of epidemic cholera—200 in all—have been examined to determine (1) How long will the organism remain in the intestinal tract of the patient? (2) When can a case of cholera be discharged without risk to the community? The figures given supply much of the answer to these important questions and are set out for weekly periods. They refer to the bacteriological isolation and recognition of the *V. cholerae* by cultural morphological chemical and agglutination testing. Three separate headings make up the short table given (1) The date of the last positive culture (200 cases) (2) The date of the first negative culture (200 cases) (3) The date of the first negative culture counting from the time of clinical convalescence (subsidence of acute symptoms) 193 cases, average duration of acute symptoms 4.5 days.

Percentages

	1st week.	2nd week	3rd week	4th week
(1)	76.5	21.5	1.5	0.5
(2)	16	75	8	1
(3)	88.1	9.3	—	2.6

It is evident that in this series 98 per cent. of the cholera stools showed their last positive culture of cholera vibrios by the second week, but that a few still gave positive cultures into the third and even the fourth week. A scrutiny of these figures justifies the observation that "it is a dangerous practice to send away active cases after saline injections, or after a few days of hospitalization or as soon as acute symptoms abate. Generally speaking in the absence of laboratory controls cholera patients should be isolated for two weeks from the date of onset or at least one week from the beginning of convalescence."

W F H

KRUEGER (Albert Paul) & SCHIBNER (E. Jane) The Bacteriophage. Its Nature and Its Therapeutic Use.—*Jl Amer Med Assoc.* 1941 May 10 & 17 Vol 116 Nos 19 & 20. pp 2160-2167 2269-2277 With 3 figs 152 refs.

This is a long article in which a mass of literature on bacteriophage is reviewed. The subject is dealt with from the points of view of the nature of phage and the experimental and the clinical evidence of its usefulness in treatment. To readers of this *Bulletin* the section dealing with choleraphage will be of interest. Most of the papers reviewed have been abstracted before but the article gives a readable and useful résumé of the subject.

C W

CATALDI (Marta S) Una nueva bacteria licuante del agar [A New Agar-liquefying Bacterium.—*Rev Inst Bacteriolg* Buenos Aires 1940 June Vol 9 No 3. pp 368-377 With 4 figs. [12 refs.] English summary

It was long thought that agar was a carbohydrate incapable of being liquefied by bacteria and it was not till 1902 that this was proved not to be the case with the discovery of *Bacterium gelatinosum*. Several agar-liquefying bacteria are now known. The present organism, isolated from activated sludge, is a new species for which the name *Vibrio agarolyticus* is suggested. It is a highly motile, Gram-negative comma bacillus with single polar flagellum, capable of growing aerobically on ordinary glucose agar at an optimum temperature of 37°C. does not attack cellulose gives neither a methyl red, nor a Voges Proskauer nor an indole reaction reduces nitrates to nitrites, and ferments many sugars but not glycerine

W F H

AMOEBIASIS AND INFECTIONS WITH OTHER INTESTINAL PROTOZOA.

PRECIS OF ABSTRACTS IN THIS SECTION

McMULLEN and GRAY (p. 588) report a 10 per cent. incidence of *Entamoeba histolytica* in stools examined in Oklahoma, and give figures of the other parasites found. REARDON (p. 588) reports *E. histolytica*

in 40-44 per cent. of patients in a hospital for mental defectives in Georgia, U.S.A. HEGNER *et al* (p 589) found *E histolytica* in the stools of 25 per cent. of schoolchildren in Mexico and note a distinctly familial incidence of the infection. In Toronto however KUITUNEN EKBAUM (p 589) found *E histolytica* only once in 324 persons examined.

SNYDER and MIRENEY (p 589) have succeeded in producing excystation of *E histolytica* in media free from bacteria by the addition of reducing agents. Excystation will not take place unless the oxygen tension is reduced either by living bacteria or by certain chemical agents. ADLER and FOWER (p 590) describe a semi-solid medium in which *E histolytica* grows well particularly if the medium is first inoculated with *Chromobacterium prodigiosum*.

In a series of 202 post mortem examinations of persons in New Orleans who had died as a result of accident, FAUST (p 590) found *E histolytica* in 13 instances in 7 of which there were associated lesions of the bowel wall. These lesions were of a mild type and did not in any case resemble the definite amoebic ulcers reported by other workers. none of the destructive processes extended below the muscularis mucosae. The author concludes that the conception of amoebic invasion of the bowel wall must be revised to include the milder type of tissue damage now for the first time clearly demonstrated. In monkeys JOHNSON (p 591) reports that although no lesions were found in three of ten infected with *E histolytica* the remaining seven showed microscopic lesions containing the parasite and concludes that this study of apparently healthy carriers gives support to the belief that it is unlikely that any infected individuals escape without some damage to the tissues.

FREEMAN *et al* (p 591) report a case of amoebiasis of the skin in a patient who had a history of recurrent dysentery for 20 years. Treatment with emetine and with zinc peroxide dressings was successful.

BEREGOFF-GILLOW (p 592) describes cases of ulcerative colitis which are stated to have been associated with amoebic dysentery.

LA BARGE (p 592) reviews the literature on amoebiasis and liver abscess in the United States discussing diagnosis and reviewing the results of treatment.

LIU (p 593) reports on the seeds of *Brucea sumatrana* and of *B javarica* in the treatment of intestinal amoebiasis giving directions for administration and an account of the treatment of 50 cases. Results are said to be good in eliminating both the vegetative and the cystic forms of *E histolytica*.

ROTHMAN and EPSTEIN (p 594) put forward the view that *Endolimax nana*, *Entamoeba coli* and other intestinal amoebae are liable to cause ill health. This opinion was not accepted by some of the speakers in the discussion which followed the reading of the paper. HOOD (p 594) claims that *Dientamoeba fragilis* is capable of causing intestinal symptoms and that the infection can be cured with emetine.

YAKIMOFF (p 595) reports that in Russia there have been several cases of human dysentery occurring along with amoebiasis in pigs but does not claim that correlation has been established.

BROOKE (p 595) discusses the cysts of *E coli* which contain more than the usual eight nuclei.

NUTTER *et al* (p. 595) describe symptoms associated with infection with *Giardia intestinalis* of which the commonest is diarrhoea. Treatment with atabrin eliminates the parasite, and in the authors' cases put an end to the diarrhoea. C IV

McMULLEN (Donald B.) & GRAY (James H.) The Incidence of Intestinal Parasites in Fecal Samples Collected in Eastern Oklahoma. — *Southern Med J* 1941 Feb Vol 34 No. 2 pp 177-180 With 1 fig [10 refs]

A survey of intestinal protozoal and helminthic infections was carried out in Oklahoma by the examination of 924 faecal specimens most of which came from the eastern part of the State. The samples preserved in iodine were sent by post to the laboratory in Oklahoma City where they were submitted to the zinc sulphate floatation method of Faust. About 60 per cent of the specimens were positive for one or more parasites the rural districts giving a figure about twice as great as that of the urban districts. The highest incidence was 47 per cent. for *Entamoeba coli* while that for *E. histolytica* was 10 per cent.

The following is the complete finding in percentages, based on cysts or eggs — *E. histolytica* 10 *E. coli* 47 *Endolimax nana* 14 *Iodamoeba bütschlii* 5 *Chilomastix mesnili* 2 *Giardia intestinalis* 5 *Necator americanus* 1 *Ascaris lumbricoides* 0.3 *Enterobius vermicularis* 0.4 *Taenia* p 0.2 *Hymenolepis nana* 5 *H. diminuta* 0.1

C M Wenyon

REARDON (Lucy V.) Incidence of *Entamoeba histolytica* and Intestinal Nematodes in a Georgia State Institution. [Research Notes.] — *Jl Parasitology* 1941 Feb Vol 27 No. 1 pp. 88-90

A number of inmates of the State Hospital at Milledgeville for mental defectives were examined for *Entamoeba histolytica* and helminthic infections. General examinations were carried out in June and November 1938 while in October an examination for *Enterobius vermicularis* alone was made. Though the infection rate was high the physical condition of those examined was good, no symptoms attributable to the infections being observed. In the table reproduced here the percentage of infection is shown —

TABLE.—Record of positive diagnoses for intestinal parasites

Date	Patients examined	<i>Entamoeba histolytica</i>	<i>Ascaris lumbricoides</i>	<i>Necator americanus</i>	<i>Trichuris trichiura</i>	<i>Strongyloides alveolatus</i>	<i>Enterobius vermicularis</i>
1938	No.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
June	72	40	14	33	83	0	83
November	70	44	0	30	51	0	89
October	88	—	—	—	—	—	27

C M W

- HEGNER (Robert) BELTRÁN (Enrique) & HEWITT (Redgmal) *Human Intestinal Protozoa in Mexico*—*Amer Jl Hyg* 1940 Sept. Vol. 32. No 2. Sect. C pp 27-44 [20 refs.]
- & — *Protozoarios intestinales humanos en México*—*Rev Inst de Salubridad y Enfermedad Trop Mexico* 1940 May Vol 1 No 2. pp 151-178 [20 refs.]

The authors have carried out an intestinal protozoal survey of inhabitants of Mexico. In all 833 individuals of different ages and social conditions were examined by a ten minutes scrutiny of one saline and one iodine preparation of faeces, following the administration of a saline purgative. The individuals examined were school children of two districts of Mexico City and individuals in six other towns. All the usual infections were noted with the exception of *Dientamoeba fragilis*, *Retortamonas intestinalis* and *Enteromonas hominis* which are difficult to identify in a rapid examination such as the one which was carried out. The persons examined were classified according to race age sex altitude of locality etc but little variation from the general result was noted. The most striking feature was the high infection rate of 25 per cent. for *Entamoeba histolytica*. Other infections were correspondingly high with the exception of *Endolimax nana* which was unexpectedly low. An interesting feature was the family incidence of *E. histolytica*. If one member was found infected other members were more often infected than the general incidence would indicate.

C M W

- KUITUNEN EKBAUM (E.) *A Survey of Entozoa in Adults in a Toronto Hospital*—*Canadian Med Assoc Jl* 1940 Nov Vol. 43 No 5 pp 451-453

Faecal samples were examined from 324 patients in Toronto Western Hospital. One or other of the common intestinal protozoa were found in 89 of these. Only one case of *Entamoeba histolytica* infection was detected. Five cases of helminthic infection were noted. A group of 306 patients examined by the swab method showed that 30 were positive for enterobiasis.

C M W

- SNYDER (Thomas L.) & MELENEY (Henry E.) *The Excystation of Entamoeba histolytica in Bacteriologically Sterile Media*—*Amer Jl Trop Med* 1941 Jan. Vol. 21 No 1 pp 63-73 With 2 plates.

The authors describe a method for obtaining cysts of *Entamoeba histolytica* free from living bacteria. When these cysts are suspended in various media they will not excyst unless living bacteria are added, or methods for decreasing the oxygen concentration of the medium are employed. Such methods are the addition of reducing agents cystine or neutralized thioglycolic acid aeration with nitrogen or extraction of oxygen by alkaline pyrogallol. Excystation was shown to occur in medium containing only inorganic salts. Continued culture of bacteria-free excysted forms has not been possible without the addition of living bacteria. It will not occur with killed bacteria. It is evident that excystation will not take place unless the oxygen tension of the medium is reduced either by living bacteria or by certain chemical agents.

C M W

ADLER (S.) & FONER (Annie) Culture of Intestinal Protozoa.—*Lancet*. 1941 Feb. 22 pp. 243-244

To the list of media which have been advocated for the culture of *Entamoeba histolytica* and other intestinal protozoa the authors add yet another. It consists of a mixture of 3 per cent agar (1 part) Locke solution (8 parts) and inactivated serum of horse, cow, goat or man (1 part). Rice starch is added and the medium tubed in 5 cc. amount. In this semi-solid medium good growths of the amoeba are obtained all through the medium particularly if the tubes are first inoculated with *Chromobacterium prodigiosum*. *Trichomonas hominis* and *Bala indium coli* were also grown in the medium. A mixed culture of *E. coli* and *E. histolytica* was inoculated subcutaneously to a rabbit. An abscess formed. No amoebae were seen in the pus but from the abscess wall *E. histolytica* was recovered. C M IV

FAUST (Ernest Carroll) Amebiasts in the New Orleans Population as revealed by Autopsy Examination of Accident Cases.—*Am J Trop Med* 1941 Jan. Vol 21 No. 1 pp. 35-48. 10 refs.]

Previous attempts to obtain information about the condition of the large intestine in cases of amoebiasis free from dysenteric symptoms have consisted in the examination of hospital patients who have died from causes other than amoebic dysentery. In all cases reported in which dysentery amoebae were found in the large intestine definite amoebic ulceration occurred. It appeared that all infections of the intestine with *Entamoeba histolytica* including symptomless carriers, were associated with the presence of typical amoebic ulcers.

In order to throw further light on the subject, the author of the present paper examined the large intestine in 202 cases of death from accident in New Orleans in which the autopsy was carried out within four hours of death. The contents of the large intestine were examined with and without concentration in wet iodine preparations. Films of the material were made for subsequent haematoxylin staining. Scrapings from any lesions present were examined while uninjured lesions were excised and fixed for sectioning. The result was the discovery of 13 cases of *E. histolytica* infection of which 7 showed amoebic lesions. The lesions were of three types: (1) initial pin-point ulceration, (2) shallow crater-like lesions, (3) extensive very shallow denudation of the mucosa. In no case were the definite amoebic ulcers reported by other observers encountered. None of the destructive processes extended below the muscularis mucosae none showed leucocytic infiltration or evidence of bacterial invasion and none had fibrous repair tissue in the vicinity. In five of the cases amoebae were found in scrapings from the lesions in two in mucus from the surface of the lesions or near by. Of the seven cases of infection in which no lesions could be detected, four showed amoebae throughout the length of the large intestine while two revealed minimal infections as evidenced by the discovery of only a single cyst in each case. As regards the position of the lesions there was a preponderance of these in the caecum-appendix area. When cysts were discovered these belonged to different races, the diameters varying from 7 μ to 16 μ . The author concludes that the conception of amoebic invasion of the human bowel wall must be revised to include the milder types of tissue damage now for the first time clearly demonstrated.

In addition to *Entamoeba histolytica* various other protozoa and certain helminths were encountered. In all 42 cases of parasitic infection were met with
C M W

JOHNSON (Carl M) *Observations on Natural Infections of Endamoeba histolytica In Ateles and Rhesus Monkeys.*—*Amer Jl Trop Med* 1941 Jan Vol 21 No 1 pp 49-61 With 4 figs on 2 plates

An examination of the faeces of a number of monkeys in Panama showed that seven local spider monkeys and four *M rhesus* from India harboured *Entamoeba histolytica*. Only one of these a red spider monkey gave any clinical signs of infection. It suffered from diarrhoea, developing finally into dysentery during the 98 days of its observation. In the whole of the time free amoebae were present. Cysts were never encountered. The animal died of its infection. After death it was found that the mucosa of the large intestine was almost completely destroyed while the submucosa revealed a diffuse amoebic invasion. The remaining monkeys appeared to be healthy carriers. They were kept under observation for periods of 40 to 623 days during which amoebae or cysts appeared to be constantly present in the stools. The ten animals were finally killed and submitted to careful post mortem examinations. Macroscopically the intestine of nine presented no abnormalities while in one the caecal mucosa revealed a slight granulation. Microscopically however seven of the ten showed lesions containing *E histolytica*. In one spider monkey and two *M rhesus* no lesions were detected. Tests for occult blood had been carried out during life with negative results thus indicating that a negative blood test is no proof that lesions do not occur. The author concludes that the study gives support to the belief that it is unlikely that any infected individuals escape without some damage to the tissues
C M W

FREEMAN (Bronley S) SCHREK (Robert) & BROWN (Paul F) *Amoebiasis Cutis Report of a Case.* [Abstract of paper read at Scientific Proceedings of the 40th Annual Meeting of the American Association of Pathologists and Bacteriologists Pittsburgh Penn. 1940 Mar 21st & 22nd.]—*Amer Jl Path* 1940 Sept. Vol. 16 No 5 p 704

A case is reported of a 48 year old laborer with a history of recurrent dysentery for 20 years. Two years prior to admission a progressive swelling and ulceration of the abdominal wall developed after a bruise with a dirty shovel. Surgical and medical treatment at various clinics did not prevail against the lesion. The patient was sent to the tumor clinic with a diagnosis of carcinoma of the abdominal wall.

Physical examination showed an emaciated male with a foul smelling abdominal ulcer measuring 15 cm. in diameter and 3.5 cm deep. The base of the ulcer appeared to be on the peritoneum. A sinus was injected with lipiodol but revealed only a long sinus in the lateral abdominal muscles and no fistula could be demonstrated. A biopsy revealed necrotic tissue and numerous amoebae in the adjacent viable tissue. The amoebae contained phagocytized red blood cells were motile in fresh smears and could be cultivated on special

abscess at the Philadelphia General Hospital over the same period there were five cases among 232 000 admissions and 24 000 autopsies. Nevertheless incidence of amoebic infection among 1 060 college freshmen in Philadelphia in 1934 was 4.1 per cent. More than four fifths of liver abscesses were in the right lobe of 2,121 collected cases 1 792 or 84.4 per cent. were in the right lobe. Clinical symptoms usually develop in three months or even less after the onset of dysentery but others may show nothing for perhaps 10 years the onset may be acute but is more often chronic, with a low type of fever weakness anorexia nausea loss of weight, chills and sallow subicteric complexion. There may be sharp rises of temperature if the lesion is extending rapidly or secondary infection occurs. Amoebae are found at the time in the stool in only a little over 10 per cent. of cases in 11.3 per cent. of 3 969 collected cases. The leucocytosis present is not extreme 15 000 per cmm is a fair average with relative polymorphonuclear count of 78 per cent. Craig's complement fixation test is a valuable diagnostic aid in difficult or doubtful cases and X ray is very dependable. Aspiration is not free from risk. WHIPPLE even goes so far as to say that the dangers far outweigh the advantages. The commonest complication of subphrenic extension of an amoebic abscess of the liver is extension to the right pleural cavity. In 52 cases with complications pleural effusion was present in 31 per cent. empyema in 15 rupture into a bronchus in 13 per cent. and rupture into the pleura in a like proportion. Rapidly developing abscesses are more likely to rupture into the cavity while those developing more slowly set up a basal pleunitis with obliteration of the cavity and extend into the lung itself.

Emetine is preferable to open operation unless secondary infection has occurred. The prognosis if the abscesses are multiple is very grave as compared with that in monolocular abscesses. Of 87 cases of single abscess the fatality was 11.4 per cent. (i.e. 10 cases) whereas all of twelve with multiple abscesses died. As regards the question of aspiration or open operation of 4 780 uninfected cases treated by open operation 44.2 per cent. were fatal whereas of 457 treated by aspiration the fatality was only 6.7 per cent. or less than one-sixth.

H H S

LIU (Hsiao-Liang) *Ya Tan Tzu* (Kho-Sam) in Intestinal Amebiasis.—
Chinese Med J 1941 Mar Vol. 59 No 3 pp 263-277
[10 refs.]

Ya Tan Tzu the seeds of *Brucea sumatrana* or *B. javanica* are imported from Canton and Hong Kong and have long been reported to possess antidyenteric properties.

The material for study consisted of a group of 50 cases. Black seeds are selected the shell broken and the kernel administered the average weight of which is 0.036 gm. Only unbroken kernels should be used because the broken surface of the kernel is very bitter and possesses emetic properties when swallowed. Each is punctured in about five places with a fine needle to about 1 millimetre in depth in order to render it more easily digested. They are then put into gelatin capsules and administered one hour before or three hours after a meal. Strict rest in bed is necessary. Dosage of the seeds is calculated by the number of kernels.

Based upon the data of 50 cases during the last four years and four months, a ten-day course for different classes of amoebic infection has been prepared. In case of diarrhoea or nausea it is advisable to suspend treatment for a day or two and use smaller doses.

The dosage over a ten-day course works out from 20-30 seeds, according to the severity of the clinical manifestations. The principle being to give smaller doses in cyst-carrier and chronic cases. The dosage is calculated on the basis of 2-3 seeds per kilo body weight. The total quantity is divided into 7 doses—one is administered daily for four days, followed by one day rest and then one every other day for three doses but the daily dosage may be given in two divided portions. Toxic effects observed were nausea, vomiting abdominal pain purging and straining but these were never severe. It is considered that the seeds are specific both for the cystic and vegetative forms of *E. histolytica*. The curative and probably curative rate for the former is 77.7 per cent and the latter 75.6 per cent. Failures are attributed to inadequacy of dosage rather than inefficacy of the drug. Some difficulty has been experienced in assessing what should be considered a criterion of cure. Some cases were only followed up for one month but other as long as two years. P M B

ROTHMAN (Maurice M.) & ERSKIN (Harry J.) Clinical Symptoms associated with the so-called Non-Pathogenic Amoeba.—*Jl Amer Med Assoc* 1941 Feb 22 Vol 116 No 8 pp 694-699 With 2 charts. '34 refs.

This is a long paper in which the authors attempt to show that any of the intestinal amoebae most commonly *Endolimax nana* and *Entamoeba coli* are liable to produce ill health. The commonest symptoms are tiredness and weakness associated with abdominal discomfort and diarrhoea. Treatment with carbarsone will get rid of the infection in a few days and at the same time there is an expression of relief in 44.1 per cent of the cases. It is assumed that the amoebae were responsible for the symptoms in this percentage of the cases while in the rest it is considered that some other cause was involved. In a discussion following the reading of the paper some speakers agreed with the authors while others thought that the large percentage of cases in which antiamoebic treatment did not produce relief disproved the author's contentions. It is noted that the antiamoebic treatment was not the only curative measure adopted. Certain dietetic restrictions were made while constipation, when it occurred, was dealt with. [For these reasons amongst many it would seem that a certain caution should be exercised before accepting the authors' conclusions.]

C M H

HOOD (Marion) Diarrhea caused by *Disentamoeba fragilis*.—*Jl Lab & Clin Med* 1940 June Vol 25 No 9 pp 914-918. With 2 figs. [14 refs.]

Observations carried out in Chicago have shown the presence of *Disentamoeba fragilis* in the faeces of certain cases of diarrhoea associated with some abdominal distress. It is noted that emetine hydrochloride or other treatments employed for *Entamoeba histolytica* infections will also eradicate a *Disentamoeba fragilis* infection. It is concluded that the cases observed afford evidence of the pathogenicity of this amoeba.

C M W

YAKIMOFF (W L) Un cas d'amibiase des porcs et la corrélation entre l'amibiase de l'homme et des porcs [Correlation between Human and Porcine Amoebiasis.]—*Jl Microbiol Epidemiol et Immunobiol* Moscow 1940 No 6 [In Russian pp 65-68 [20 refs] French summary (7 lines)]

A translation of the author's summary reads —

The author has observed in a State farm that the pigs suffered extensively from disease. Some of the animals showed amoebae in large numbers and the author considers these to be *Entamoeba Debileckis Nieschulz*.

In reviewing the available literature concerning correlation between human and porcine amoebiasis the author concludes that this question is by no means settled. Nevertheless he records several cases of human dysentery which occurred along with the disease in the pigs.

C H

BROOKE (M M) Supernucleate Cysts of *Entamoeba coli*—*Amer Jl Hyg* 1940 Nov Vol. 32, No 3 Sect. C pp 100-111 With 5 figs. & 1 plate [14 refs.]

It is well known that though the mature cyst of *Entamoeba coli* contains eight nuclei under certain conditions both in the intestine and in cultures cysts with a larger number of nuclei may be encountered. In the present paper the author describes his observations on the cysts from a case of *E. coli* infection in which 33.7 per cent. of the mature cysts contained more than eight nuclei. These supernucleate cysts were generally larger than the ones with eight nuclei and had from ten to sixteen nuclei except in three instances when 18, 22 and 30 were present. In supernucleate cysts the nuclei were variable in size. It is generally supposed that prior to encystment *entamoebae* divide to produce smaller precystic amoebae. It is suggested that if encystment occurs before this division has taken place there might be a tendency to the production of more than eight nuclei.

C M W

NUTTER (Paul B) RODANICHE (Erid C) & PALMER (Walter Lincoln) *Giardia lamblia* Infection in Man—*Jl Amer Med Assoc* 1941 Apr 12 Vol 116 No 15 pp 1631-1632

The authors have carried out a careful study of fourteen cases of *Giardia intestinalis* infection. In all cases there was persistent or intermittent diarrhoea. Other symptoms complained of were fatigue, weakness, abdominal pain with flatus, blood in the stools, insomnia, dizziness, nervousness and loss of weight. The blood of all the patients was found to be normal except that of one with pernicious anaemia. Blood was found by benzidine technique in the stools of four, but this could be fully accounted for by co-existing disorders. Duodenal drainage showed vegetative forms of the flagellate in all but two of the cases. In these it must be assumed that the vegetative forms occurred elsewhere in the intestine. The microscopic appearance of the duodenal contents showed little if any abnormality. Although some observers have claimed that severe biliary symptoms may be associated with giardiasis this was not the case in the series studied. Treatment with atabrin (0.1 gm. three times a day for five days) will eradicate the parasite, the cysts disappearing from the stools in three days. In

only one of the cases was a second course necessary. The symptoms complained of often but not invariably disappear after treatment. In the present series the diarrhoea ceased in every case. Though the series of cases observed is small it is clear that a very careful study of these has been made. The paper in marked contrast to many publications which have been made on the subject, is a valuable contribution to our knowledge of the infection. C. M. W.

BACILLARY DYSENTERY

PRÉCIS OF ABSTRACTS IN THIS SECTION

MARSHALL and his co-workers (pp. 596-597) describe the properties and pharmacological action of sulphanilguanidine, a drug which is soluble in water but which is poorly absorbed from the gastrointestinal tract. The drug has been used for the treatment of acute bacillary dysentery in children and the authors give an account of 17 cases. The results in those cases in which treatment was commenced early were consistently good, but in those in which it was deferred the results were not uniform. A further series of 20 cases treated elsewhere is referred to; in these the results were very good, improvement being in some instances dramatic. No definite toxic effects were observed. The authors give details of dosage. In comment it is noted that the infections concerned were with the Flexner and Shiga organisms; it remains to be seen what effect the drug will have in Shiga infections. LYON (p. 599) describes in more detail the series of patients referred to above. RAVENEL and SMITH (p. 600) report success in treatment with sulphapyridine and sulphathiazole, giving details of dosage and additional measures. Sulphanilamide is apparently ineffective.

SINGH (p. 600) writes of the value of spaghula, a preparation of the seeds of *Plantago ovata* or of *Spergula* in the treatment of dysentery in India. C. W.

MARSHALL (E. K.) Jr., BRATTON (A. Calvin), WHITE (H. J.) & LITCHFIELD (J. T.) Jr. Sulfanilylguanidine, a Chemotherapeutic Agent for Intestinal Infections.—*Bull. Johns Hopkins Hosp.* 1940 Vol. 67 pp. 163-188.

It has been found that several sulphanilamide derivatives though water-soluble are but poorly absorbed from the gastro-intestinal tract and thereby a new avenue of approach has been opened up to the chemotherapy of intestinal infections. Up to the present the use of intestinal antiseptics has depended upon low water solubility so as to avoid absorption. In contradistinction the idea here expressed is in a drug which is purely water-soluble therapeutically active but is not absorbed from the intestinal tract. It is claimed that this departure presents a new principle in the use of the new bactericidal chemotherapeutic agents. The fundamental principle so involved is the achievement of a high concentration of the drug in the intestine contrasted with its low concentration in the blood and tissues—somewhat comparable with the concentration of sulphonamide derivatives in use as urinary antiseptics.

Sulfanilylguanidine was found to be the most highly bactericidal of the compounds studied. The authors have described a method for the preparation of N⁴ acetylsulphanilylguanidine from which the drug is obtained by hydrolysis. The pure crystalline compound has a water solubility of 220 mgm per 100 cc. and the solution is practically tasteless and has a pH of 6.9. The preparation and properties of the monochloride dihydrochloride and picrate have been described.

The drug can be detected in blood, urine and cerebrospinal fluid by the colorimetric methods employed for sulphanilamide derivatives. Dogs tolerate the maximum possible intravenous injection of 0.2 gm per kilo and it can be injected intraperitoneally in large doses dissolved in olive oil and is less toxic by this route than sulphapyridine. In rabbits it is converted into the *acetylate* and the acetylated derivative is deposited in the renal tubules causing diminished function. In mice absorption is slower than that of sulphapyridine by the mouth but from the peritoneal cavity it is readily absorbed penetrating all tissues rapidly with the exception of the brain and it passes into the spinal fluid more slowly than either sulphanilamide or sulphapyridine. After intravenous injection it is excreted within 24 hours. From the small intestine it is probably more readily absorbed than from the large. Its effect against experimental mouse pneumonia is comparable with that of sulphapyridine though somewhat less effective against experimental β -haemolytic streptococci but *in vitro* tests with a number of bacterial species demonstrate that it is at least as effective as sulphanilamide and the number of coliform organisms in the intestinal contents of mice is markedly reduced by placing them on a dietary containing 1 per cent of this drug. *P. Manson Bahr*

MARSHALL (E. K.) Jr BRATTON (Calvin) EDWARDS (Lydia B.) & WALKER (Ethel). Sulfanilylguanidine in the Treatment of Acute Bacillary Dysentery in Children—*Bull. Johns Hopkins Hosp.* 1941 Jan. Vol. 68 No. 1 pp. 94-111.

Saturation of the intestinal contents with this drug can be obtained with a dosage that gives a low concentration in the blood, confirming deductions previously made from observations on experimental animals. The drug was prepared by the method described above. The monohydrate was employed though figures in this paper for blood and stool concentrations refer to the anhydrous compound.

The technique of determination of the sulfanilylguanidine content of the stool is rather complicated—it is gauged by a colorimetric process. A 5-10 gm sample is taken from the total excreta, emulsified, filtered and 12 per cent. trichloroacetic acid added.

Sulfanilylguanidine is soluble in water at body temperature to the extent of 200 mgm per cent. A table is given of the concentration of the drug in the stools obtained with various dosage schedules which are sufficient for a saturated aqueous solution. In one particular case of ulcerative colitis with ileostomy material from the end of the small intestine contained the drug in concentrations greater than 200 mgm per cent. In one case with a maintenance dose of 0.05 gm per kilo every four hours more than sufficient of the drug was present to ensure saturation with 1-4 stools per diem whilst the blood concentration of the drug remained at a low level. Data are available on the concentration of sulfanilylguanidine in the blood with various dosage schedules. In children for instance, with a maintenance dose

of 0.05 gm per kilo every four hours, determinations on 17 patients gave an average value of 1.91 mgm per cent. for free sulfanilylguanidine and of 2.52 mgm per cent. for the total drug. In this group the average acetylation of the drug in the blood was 24.2. It was noted that blood concentrations are higher in adults than in children with the same dosage though there appears to be a slightly greater acetylation in adults than in children.

In the urine with a dosage of 0.05 gm per kilo every four hours the average urinary excretion was 13 per cent. of the amount ingested every day and 31 per cent. was acetylated.

The clinical experience with the sulfanilylguanidine treatment of acute bacillary dysentery included 17 cases where the diagnosis was made certain by the recovery of the organism from the faeces. Treatment with the drug was commenced within twenty-four hours of admission as soon as the diagnosis of probable dysentery was made. Initial doses were 0.1 or 0.2 gm per kilo whilst maintenance doses varied from 0.1 gm every 8-12 hours to 0.05 gm per kilo every four hours. In the case of vomiting distension or severe dehydration a period of preliminary starvation was instituted and parenteral fluids administered as required by the subcutaneous or intravenous routes. During the period of sulfanilylguanidine therapy haemoglobin and leucocyte determinations were made every two days. Results of treatment initiated early in the disease differed strikingly from that later in the illness. In 7 children on or before the third day of the disease results were uniformly good. All were young—under five years of age—all had high fever prior to therapy, five had convulsions and six were seriously ill, but within 28 hours after treatment had commenced temperatures had fallen to 100.4°F and the children subsequently remained afebrile. Some appeared well after only 24 hours therapy and the diarrhoea was checked in from 1-3 days. In ten treated late in the disease from the 4-14th days results were not uniform. In a similar number faeces culture became negative for dysentery organisms during treatment. In five, stools became negative on the last day of therapy and within two days of its discontinuance but in one (Sonne infection) culture was positive after drug administration.

Several other children with chronic bacillary dysentery, typhoid fever and one boy with chronic ulcerative colitis showed no response to the drug.

To this series is added the testimony of Dr. G. M. Lyon of Huntingdon on the results of treatment of twenty cases controlled by a parallel series, using alternate cases [see below]. One case showed good therapeutic response, fourteen excellent, many recoveries were dramatic, and five only seemed to follow the general course of the untreated cases. The age of the patients is not stated.

No definite toxic effects were observed in the series of children, the vomiting which was noted being attributable to the disease and not to the drug. In twenty-five adults receiving the drug for a variety of conditions toxic reactions were suspected in three on rather uncertain grounds: one had unilateral conjunctivitis, a second mild haemolytic anaemia and a third slight fever. Most cases had a leucocytosis of 11,000-30,000 on admission to hospital but the counts dropped to normal within three days and the drug did not appear to exert any deleterious effect on the leucocytes. In two cases there was a relative leucopenia from the commencement.

The following dosage programme is recommended for further trials of sulfanilylguanidine in bacillary dysentery —

Initial dose 0.1 gm. per kilo by mouth

Maintenance dose 0.05 gm. per kilo every four hours till the number of stools daily is less than four subsequently 0.1 gm. per kilo every eight hours for at least three days. The finely powdered drug is given in milk or water. It should not be continued for more than 14 days because of the possible danger of agranulocytosis.

For adults the dosage schedule is the same as for children except that the drug is given every 8 hours 0.05 gm. per kilo in place of 0.1 gm. per kilo.

[The data given in this paper it will be noted apply to Flexner and Sonne infections only. The results of this treatment on the more acute and toxic Shiga infections will be awaited with great interest. This review should be read in conjunction with the foregoing.]

P M B

LYON (George M.) Sulfanilylguanidine. Treatment of Acute Bacillary Dysentery—*U.S. Nav Med Bull* 1941 Apr Vol. 39 No 2 pp 278-293 With 2 figs

In assessing the value of chemotherapy in acute bacillary dysentery it is important that cases included in study should be relatively similar in character and severity in order that a fair comparison can be made.

Twenty three with acute bacillary dysentery were treated with sulfanilylguanidine and a similar number taken as controls alternate patients being treated.

Those that did not receive sulfanilylguanidine exhibited the characteristic clinical course with pyrexia nausea vomiting bloody diarrhoea abdominal cramps and tenesmus sometimes prolapsus ani thin purulent diarrhoea and loss of weight. In the third week there was a tendency to convalescence intestinal indigestion and continued weakness. Of the twenty three receiving sulfanilylguanidine five were not obviously benefited whilst the remainder eighteen were strikingly improved. Many recoveries were dramatic after institution of this drug therapy a fall of temperature and leucocyte count occurred within 24-48 hours as well as closely parallel general clinical improvement and reduction in the number of stools. In 48-72 hours there was freedom from blood pus and mucus in the stools. The drug is most efficacious when administered 3-4 days after onset of fever or diarrhoea. The percentage of failures may be higher when the drug is not given after the fifth day of illness sometimes it seemed to be effective when given later.

Generally speaking the use of the drug is unaccompanied by toxic effects and they appear to be less than that of related compounds (sulphapyridine and sulphathiazole). Of 23 patients only three showed tendency to nausea and vomiting but these symptoms were quite as common in the control group. The patients were mostly children but range in age was extreme, from 2 months to 75 years. Routine treatment consisted of the customary general measures with good fluid balance serum transfusions intravenous dextrose and when indicated a bland high protein low fat dietary.

Sulfanilylguanidine was given so that patients received 0.1 gm. per kilo as initial dose and 0.05 gm. per kilo every four hours as

maintenance dose. When the stools were less than five, frequency of administration was reduced so that the patient received 0.05 gm. every four hours as maintenance dose. Attempts were made to estimate the concentration of the drug in the blood. Concentration in the blood varied generally between 1.3 to 3.6 mgm. per cent., the highest observed was 5.2 mgm. per cent.

[A possible fallacy in this study is that the nature of the infecting organism was not ascertained and cases were, in many instances, the patients of fellow practitioners.]

P M B

RAVENEL (Samuel F.) & SMITH (D. Lesane) Sr. The Chemotherapy of Bacillary Dysentery.—*Southern Med J* 1941 May Vol. 34 No 5 pp 504-510 With 10 charts [13 refs.]

The incidence of bacillary dysentery in south-eastern United States is estimated at 20 000 cases a year with a fatality rate of about 5 per cent. It is considered that quantitative and qualitative replacement by intravenous glucose and blood transfusion continues to save many babies with dysentery and introduction of raw apple dietary and pectin may also have contributed something.

In spite of these advances dysentery continues to be a serious disease with prolonged exhausting course and high mortality especially in small children.

The authors consider that a third epoch has now been reached with the introduction of sulphonamides. In 1938 and 1939 they used sulphamidazole in seven cases without demonstrable effect. Since July 1939 they substituted sulphapyridine when the drug restored to health a female infant of 4 months who was dehydrated and comatose. Protocols of 20 cases are given but unfortunately the nature of the infecting organism was not ascertained. Infants ranged in age from 2½ months to 2½ year. The action of the drug was seen in the cessation of pyrexia and the almost instant abatement of the diarrhoea.

One series was treated with sulphapyridine and another with sulphathiazole. The dosage varied from 1½-2 grains per pound body weight (220-286 mgm per kilo) for the first day and 1-1½ grains per pound each 24 hours thereafter. Administration was stopped within 4-6 days in which time stools were normal. The tablets were crushed in a small quantity of water milk or fruit juice and were given at intervals of 4-6 hours. Vomiting did not occur with sulphathiazole and was rare with sulphapyridine. Procedures ordinarily used to combat or prevent, dehydration and shock were employed when indicated. The importance of early starvation and subsequent furnishing of adequate food and vitamins was not neglected.

P M B

SINGH (B. H.). A Simple Treatment of Dysenteries and Diarrhoea.—*Indian Med Gaz* 1940. Dec Vol 75 No 12 pp 733-734

The author uses ispaghula (the seed of *Plantago ovata* or of *Spartium*) in the treatment of these conditions. The seeds are cleaned and a fresh decoction is prepared daily by boiling two drachms of the seeds in one pint of water for 10-15 minutes and then straining through cloth. This may be sweetened. The patient drinks 3 ounces every two hours and finishes the whole by the evening. It is soothing

and pleasant and acts probably by coating the inflamed bowel wall with a thin layer of mucilage. It is more effective in acute than in chronic cases. Calcium lactate in 10 grain doses may be given in addition if there is much blood in the stools and if the latter are too frequent the addition of 5-10 grains of alum to the decoction is advised. In amoebic dysentery emetine may be given at the same time.

The author claims good results from this method of treatment but does not give figures. In an editorial comment it is stated that ispaghula is regularly used for chronic diarrhoea or dysentery in the Calcutta School of Tropical Medicine. C IV

HODGE (E H Vere) *Modern Views of the Dysenteries and their Treatment.*—*Practitioner* 1941 June Vol 146 No 6 pp 385-371 [18 refs]

BERIBERI AND NUTRITIONAL OEDEMA

PRÉCIS OF ABSTRACTS IN THIS SECTION

PANNKOEK WESTENBURG and VAN VEEN (p 602) as a result of estimation of vitamin B₁ in the blood of healthy persons of patients with nutritional oedema (in whom the values were found to be normal) and of patients with beriberi (in whom the values were not correlated with symptoms) conclude that at present this test is not of practical importance.

MEYERS (p 602) shows that aneurin possesses the properties of a true diuretic. the excretion of aneurin in the urine after administration does not often give results which can be taken as indicating aneurin deficiency but an increase in systolic blood pressure after administration of aneurin and adrenalin was marked in the beriberi patients so tested, but was not present in persons who had previously been on a diet rich in aneurin. This reaction appears to be a result of unbalanced vascular tone.

SHINDO (p 603) has studied the blood picture in infantile beriberi. He (p 604) shows that in rats fed upon a beriberi producing diet there is an increase in the blood platelet count and there appear pathological granules in the neutrophiles. Administration of vitamin B₁ restores these conditions to the normal.

GUTIERREZ (p 604) has estimated the deterioration which occurs in preparations of tikiki stored for long periods. He recommends that they should not be used later than one year after preparation and that this date should be clearly marked on the containers.

DE OCAMPO AND CRUZ (p 605) investigated the dark adaptation of patients with beriberi and concludes that in most cases there is deficiency in vitamin A as well as in vitamin B.

WIRJOBOEDIHARDJO (p 605) records nutritional oedema in Bodjonegoro. this is not related to vitamin deficiency but to low albumin and cholesterol values in the blood resulting from a diet of poor quality. C II

PANDEKOEK WESTENBURG (S. J. E.) & VAN VILLEN (A. G.) Het vitamine B₁-gehalte van het bloed van gezonden en zieken. [The Vitamin B₁ Content of the Blood of Healthy and Sick Persons.]—*Geneesk. Tijdschr. v. Nederl.-Indië* 1940 July 23 Vol. 80 No. 30 pp 1774-1784 With 1 chart. [21 refs.] English summary.

1 Of 390 Blood samples of healthy and sick people the quantity of aneurin present was determined by means of Schopfer's Phytomyces test as modified by Meikleyjohn.

2 The aneurin values (not corrected with Simclair's factor) found in the blood of 80 normal natives which were on an average $9 \pm 2\gamma$ per 100 cc of blood agree with those mentioned in European and American literature. As the limit of B₁ deficiency we assumed a value of 5.5 γ . In 6 out of these 80 persons the aneurin content of the blood was 5.5 γ or less.

3 The B₁ levels in the blood of 165 nutritional oedema cases on the whole agreed with those of normal persons. There is probably no relation between the nutritional oedema observed here and the vitamin B₁ level of the organism. Only in one group of 22 persons the number of low values was large viz 13. A possible explanation is to be found in the fact that these cases had extreme anaemia with low blood cell volumes.

4 In 19 patients with clinically evident beriberi very divergent aneurin values were found. 9 of them were definitely low but normal aneurin contents also occurred amongst them even in serious cases. This may partly be explained by the fact that these outpatients may have had B₁-rich food and even B₁ tablets before treatment began as the cause of beriberi is well-known by many natives. Since the organism cannot store up much vitamin B₁ the body and the blood may soon be saturated while the clinical symptoms of beriberi still exist.

5 All but two of 19 polyneuritis patients of various origin had a normal B₁ level. The two low values were one case of lues and one of alcohol-polyneuritis.

6 The aneurin content of 10 tabes dorsalis patients was normal. This number is however too low for conclusions.

7 From the above it will appear that the determination of aneurin in blood is as yet of no great practical importance. No conclusions as to the presence of a B₁ deficiency may be drawn merely from the aneurin level of the blood. The cell volume should also be taken into account.

MEYERS (F. M.) Clinische onderzoeken in verband met ber-ber-III Over het z.g. subclinische aneurine (vitamine B₁) tekort [The so-called Subclinical Deficiency of Aneurin (Vitamin B₁)]—*Geneesk. Tijdschr. v. Nederl.-Indië* 1940 July 16 Vol. 80 No. 29 pp 1727-1746 With 2 graphs. [33 refs.] English summary.

"In a preliminary remark it is pointed out that descriptions of subclinical aneurin (vitamin B₁) deficiency from the temperate parts of the world show a much wider range of symptoms than those of the tropics. It is believed that this difference in symptoms arises from different conditions of disease. In the Netherland East Indies at

least, aneurin deficiencies are relatively uncomplicated and chiefly of exogenous origin. In Europe and in the United States these sub-clinical deficiencies are often conditioned by alcoholism and chronic diseases of the intestinal tract and are mixed furthermore with pellagra in its forme fruste.

In a number of cases of healthy Javanese estate-labourers the excretion of aneurin in the urine has been investigated before and after subcutaneous test doses. At the same time attention has been paid to the diuretic effect of aneurin and to its influence on the increase of blood pressure after epinephrine. The findings could be compared with those of 3 healthy prepared persons who had received a diet rich in aneurin and with those of 3 cases of mild beri beri.

In the healthy individuals the daily excretion of aneurin was found to be from 0.63 micro g. with an excretion after test doses of 2-50 per cent. (in most cases 10-30 per cent.) One healthy prepared person however showed excretion values of the same order as those of the patients with beri beri.

In 9 out of 14 healthy persons a definite diuretic influence of the test doses could be established. There was no clear correlation with the aneurin excretion values. Aneurin has properties of a true diuretic.

In 3 out of 8 healthy individuals the increase of systolic blood pressure after epinephrine became much stronger after the test doses with aneurin had been given.

The same occurred in the cases of beri beri but in none of the 3 prepared individuals. Thus this vascular reaction proved to be a valuable means in establishing conditions of aneurin deficiency where other means had failed but no definite correlation could be detected with the excretion of aneurin in the urine. The reaction seems to be a consequence of an unbalanced vascular tonus with repeated injections of epinephrine and before the test doses had yet been given the rise in blood pressure became much stronger as was the case in the persons with a negative vascular reaction.

The excretion of aneurin in the urine alone often does not seem to produce figures that are sufficiently unequivocal to judge whether in individual cases a condition of deficiency is present or not.

SHINDO (Masayuki) *Change of Blood Picture of Infantile Beriberi Infantile Preberiberi (Sato) and Infantile B-avitaminotic Dyspepsia (Sato) on an Administration of Vitamin B—Tohoku J. Exper. Med. 1940 July 5 Vol. 38 No 5 pp 403-413 [23 refs]*

The haematological findings are tabulated of 23 breast fed infants diagnosed as cases of infantile beriberi infantile preberiberi or B-avitaminosis.

The author concludes that the blood pictures are characterized by anaemia hypohaemoglobinaemia thrombocytosis neutropenia with an increase in pathological granules and a nuclear shift to the right lymphocytosis and eosinophilia. [It seems doubtful however whether all these conclusions are justified, as many of the author's figures do not depart significantly from those found in normal infants.]

In 6 of the cases further examinations were made after vitamin B₁ had been administered and a return of the blood pictures to normal was noted. The actual figures however are not given.

L. J. Davis

prevention a reference to SPROULE's recent work on the destruction of cercariae by chlorination in Army water carts would have been timely [see this *Bulletin* 1940 Vol. 37 p. 148]. The chemotherapy of sleeping sickness and of kala azar has lately been strengthened by YORKE's work on 4-4-diamidino stilbene which appears to be most satisfactory in the refractory kala azar of the Sudan. In the treatment of sprue nicotinic acid is probably of greater importance than the author indicates.

There is a good account of trench fever and of the typhus group. It would be well to emphasize that in the Weil-Felix reaction, only agglutinations of the *O* variants of *Proteus* $\lambda 19$ and λA are valid.

These are the criticisms which may be made. They are of minor details only. Against them may be set the virtues of clarity and conciseness and the authoritative setting out of known facts in order. The work is not over-dogmatic as it might have been and discussion of debatable subjects is not avoided. For its declared purpose the book is excellent.

C. H.

TROPICAL DISEASES BULLETIN.

Vol. 38.]

1941

[No 11

SUMMARY OF RECENT ABSTRACTS *

IX. LEPROSY

Epidemiology

MONACELLI (p 48) states that there are several endemic foci of leprosy in Sicily and has described the new leprosarium at Messina.

MUIR (p 328) reports on leprosy in Southern Africa. It is common in the hot, damp low lying areas around Lake Nyasa and in the basin of the Zambesi. In South Africa a severe type is seen in Europeans but the numbers are decreasing. BRIERCLIFFE (p. 624) estimates the number of lepers in Nigeria as 200 000 or at least 1 per cent. of the population this number is probably exceeded only in India and China. The Commission on leprosy in the Belgian colonies (p 637) states that in the Congo 60,363 cases have been found.

BOENJAMIN (p 627) estimates that there are at least 1 000 lepers in Batavia representing an incidence of 2 per 1000.

DELINOTTE (p 636) states that in the French colonies there are 104 000 known cases and it is estimated that 170 000 further cases exist.

In Brazil, BARKETO (p 637) states that there are 35 241 known cases. There are 41 dispensaries and the institutions now existing or planned will enable 24,888 patients to be accommodated. MALDONADO ROMERO (p 330) calculates the incidence of leprosy in Colombia as 1.92 per thousand of the population. In Sotomayor Colombia, GEORGE (p 330) states that the incidence is 3.6 per 1 000 and the number of cases is increasing it is believed that dietary deficiency is an important contributory cause.

In the report of the Saidapet Health Project (p 625) the importance of contact with open cases is stressed in one village every definite case was shown to have had contact with an open case but it is pointed out that the whole village may be regarded as one family group.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1940 Vol. 37. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

AUSTIN (p. 626) shows that in the Fiji Islands the incidence of leprosy depends essentially upon the density of the population by means of a genealogical tree he has traced 58 lepers in one family group

Actiology

LIMA and ARANTES (p. 332) state that they have obtained growths of *Myc. leprae* from human material, in Santon's medium, failing only twice in 38 attempts. From microscopic examination of the growths they claim that the organism passes through various phases. GAVRILOV and FESTER (p. 333) report success in the cultivation of the bacillus of rat leprosy in animal tissue culture.

MANALANG (p. 332) reports on a study of the morphology of *Myc. leprae* in human tissues. The interpretation of the granular forms, and the significance of the predominance of a certain form in a lesion, remain a matter for conjecture.

BURNET and JADYARD (p. 331) have apparently succeeded in infecting a hamster by feeding it on leprosy material daily for 12 days. DOULI and MEGRAIL (p. 627) record success in infecting a Syrian hamster with material from a human case. LAIDLAW (p. 628) found that after hamsters had been infected from human material obtained from the Belgian Congo material from their lesions when inoculated into other hamsters and into white rats, produced rapidly spreading infection. This fact together with observations on the tissues of the animals, suggested that the lesions from which the material was originally obtained were due to infection with the organism of rat leprosy and not to the usual human type though the appearances in the original patient had aroused no suspicion of origin from the rat leprosy bacillus. The possibility that human leprosy originated from the more prevalent rat leprosy is discussed.

COCHRANE *et al.* (p. 331) report experiments in which material from human nodular lesions was inoculated into monkeys from which the spleens had been removed. The results were inconclusive but reveal the possibility of individual resistance.

OTA and SATO (p. 628) found results in hens inoculated with human or rat leprosy bacilli which indicated that multiplication had taken place together with more characteristic macroscopic and microscopic changes than are found in other experimental animals.

MARCHOUX and CHORINE (p. 49) show that rat leprosy bacilli cannot penetrate the skin of rats after simple depilation, in which the roots are left intact, but that if the hairs are pulled out they can penetrate through the small wounds thus formed.

Pathology

RODRIGUEZ *et al.* (p. 630) report lepromatous changes developing in three cases of macular leprosy.

ERMAKOVA (p. 629) has described the histopathology of anaesthetic patches, depigmented macules and tuberculoid lesions. In all there was chronic inflammatory change with polyneuritis.

SAENZ and PALOMTASO (p. 39) give a description of tuberculoid leprosy which can only certainly be recognized by macroscopical examination. Anaesthesia is a constant symptom in parts of the skin lesions and the bacilli may be absent or very scarce. WADE *et al.* (p. 631) discuss the course of tuberculoid leprosy showing that there is

no fundamental type differentiation between the major tuberculoid lesions and those of the lesser forms of neuromacular leprosy. Spread may take place by extension and not necessarily by metastasis but there may be a secondary eruption papular or macular which is apparently due to metastatic dissemination. LOWE (p 39) has found tuberculoid changes in lymph glands in leprosy. SCHUJMAN (p 39) regards tuberculoid leprosy as a manifestation of the allergic state and has not seen any case in which this form has become lepromatous. The Mitsuda test is positive in tuberculoid and negative in lepromatous cases. STEIN (p 631) also considers that tuberculoid changes are the expression of a peculiar allergic condition, accompanied by strongly developed immunity and occur when the course of the disease is benign.

MUIR (p 333) discusses resistance in leprosy. Natural resistance is inborn in most subjects but is low in children. It does not appear to vary much in families or races. General resistance is in proportion to general health. Acquired resistance may be systemic or local.

Clinical

MUIR (p 41) discusses the mental changes brought about in lepers by the attitude adopted to them by the general community.

RODRIGUEZ and WADE (p 338) have studied the progress of 46 neural cases in which little or no treatment was given during a period of 5 years. In 33 the original lesions had either disappeared or improved but the authors consider that still better results would have been achieved with regular treatment. They also refer to two cases of tuberculoid leprosy in which reaction occurred after a long quiescent period or after apparent recovery. RISHI (p 339) reports a higher rate of relapse in lepromatous (18.0 per cent.) than in neural cases (8.5 per cent.) in India among a group of arrested cases observed over long periods. The chances of relapse beyond 10 years of arrest appear to be small.

BECHELLI (p 41) records a case of leprosy in which the condition started in the form of polyneuritis with involvement of the sciatic and popliteal nerves and the brachial and cervical plexuses.

DE BARROS (p 40) discusses the eye lesions found in leprosy. There is parallelism between corneal and skin lesions with infiltration, nodule formation or both. In the iris there may be diffuse inflammation or miliary nodules and the characteristics of these two forms are described.

GERMOND (p 338) discusses the differential diagnosis of circinate tuberculoid leprides and polycyclic syphilides. CAMPOS and ALAYON (p 42) also note the resemblance between certain syphilides and leprotic lesions particularly tuberculo-circinate lesions of the skin.

MUIR (p 340) points out that Epidermophyton infections are troublesome complications of leprosy and that the loss of sweating power predisposes to them. He gives details of a treatment advised. RYRIE (p 337) has found that plantar hyperalgesia is a useful early sign of the leprosy reaction and describes his method of eliciting it. It is associated with high sedimentation rate and a high proportion of positive findings on examination of thick blood films. It therefore appears to be an indication of progressive disease.

STEIN (p. 334) describes inflammatory changes of a hyperergic type with necrosis and suppuration in lepromatous granulomata during the course of the lepra reaction.

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STEIN (p 334) describes inflammatory changes of a hyperergic type with necrosis and suppuration in lepromatous granulomata during the course of the lepra reaction.

NÚÑEZ ANDRADE (p. 42) has tabulated the principal causes of death in lepers in Mexico and at Cullion. In Mexico enterocolitis and leprosy cachexia are the most common. At Cullion on the other hand, pulmonary tuberculosis, nephritis and bronchopneumonia head the list. The facts are recorded no explanation is attempted.

MAXALANG (p. 630) found 23 per cent more positives by using the Cooper modification of the Ziehl-Neelsen staining technique than by the ordinary method.

ROTHBERG (p. 43) discusses the lepromin test and the criteria on which it may be regarded as positive. In the nodular form it is negative but a non-specific papular reaction reaching its maximum before the fifth day and persisting sometimes to the fourth week, may be seen and should not be confused with a true positive. In the tuberculous form the true positive reaction occurs, reaching its maximum from the second to the sixth week and often suppurating. FERNANDEZ (p. 632) similarly states that with the lepromin test there is an allergic reaction which may be seen after 48 hours as well as the late result in the third or fourth week. In 95 per cent of cases the early and the late reactions agree though they are probably produced by different fractions of the leprosy bacillus. A filtrate of lepromin always gives the early reaction in allergic cases, but rarely the late reaction and then only faintly. MENDES and GIL DE CASTRO CERQUEIRA (p. 336) find that the active fraction of lepromin is the non-filterable constituent, and that different preparations vary greatly in activity so that standardization is necessary.

LARA (p. 335) has investigated the lepromin test in children of leprosy parents. The impression was gained that it is of no value as an index of resistance in children over one year that it has no prophylactic value in such children, and that there is a possibility that it may act provocatively.

LAGROSA (p. 335) found, in a series of lepromin tests in bacteriologically negative lepers that the proportion of negative reactors steadily diminished as the tests were repeated. At the fourth test all gave positive results. Similarly in bacteriologically positive cases, IGNAO (p. 335) found that whereas only 21 per cent. were positive to the first test the proportion had risen to 80 per cent. at the fourth. The reactions could not be correlated with the clinical changes. LARA (p. 632) found that contrary to earlier statements, the lepromin test may be positive in children below one year of age and that if the test is repeated every four months most children of leprosy give positive results. Early lesions in the children were associated with undiminished tendency to react positively and the duration and constancy of exposure to infection appeared to bear a direct relation to the proportion of positive reactions.

BLACK and ROSS (p. 42) have examined lepers and non leprosy controls by the complement fixation test of Lleras Acosta, and conclude that, because of the few positive results obtained in neural leprosy and the relatively large number of positive controls, the test is of no practical value. RADVA (p. 336) regards the Witebsky Klingenstein-Kohn reaction as of diagnostic value in bacteriologically negative neural leprosy. He (p. 337) considers that the Wassermann reaction is only positive if syphilis is present. MONTIEL *et al.* (p. 43) have not found the Verneis flocculation reaction to be of value in the diagnosis of leprosy.

JUSCHKO (p 44) has found that in leprosy the absorption of saline injected intradermally is more rapid than in normal persons. This test is of some value in determining the general state of the patient.

DHARMENDRA (p 337) confirms earlier findings that there is a shift to the left in the Arneeth count in leprosy

Treatment

BEAUDIMENT and RIVOALEN (p 340) state that chaulmoogra oils should show not more than 6 per cent acidity for oral use 3 per cent. for intramuscular or subcutaneous use and 0.8 per cent. for intravenous use. Neutralization does not diminish the activity of the oils and the authors describe a simple method of effecting neutralization. PAGET *et al* (p 45) discuss the irritant action of some hydnocarpus preparations

DUBOIS and RESSELER (p 340) describe an emulsion of chaulmoogra oil of which they give a good account in treatment. For intravenous use RADNA (p 342) employs a mixture of 7 parts chaulmoogra oil and 3 parts of a 3 per cent. solution of gynocardate of soda. For intradermal use he mixes chaulmoogra oil with 2 per cent. creosote.

MOISER (p 633) analyses the results of treatment with a number of preparations and indicates that in his cases Moogrol gave the best results.

GRIMES (p 46) reports excellent results from the use of fluid and alcoholic extracts of the dried plant *Hydrocotyle asiatica* given by the mouth. This treatment is most effective in lepromatous cases but is also useful in neural leprosy.

ETCHEVERRY (p 46) writes of the value of injections of bile salts dissolved in saline in treatment. For lepromata he injects solutions of 2-3 per cent. into the nodules. These cause reactions which gradually subside and permit of repetition in 8-10 days. For eye lesions solutions of 0.5-1 per cent. are used as baths or are injected subconjunctivally (in which case the diluent is isotonic glucose solution) or an ointment of the same strength may be applied. He claims good results by these means.

Discussing the treatment of leprosy DELANOE (p 44) advocates the constant changing of drugs so that the bacilli cannot become accustomed to any one. He claims good results and gives a list of the drugs used.

GMINDER (p 333) considers that vitamin deficiency predisposes to leprosy infection and records considerable success in the treatment of generalized leprosy with Betaxin the synthetic crystalline vitamin B₁. HOU (p 635) shows that in leprosy the urinary excretion of vitamin B₁ is far below normal but may be raised by oral administration. He therefore advises that vitamin B₁ should be given especially in cases in which neuritis is present. BLURTH (p 47) reports useful results in vaso-dilatory symptoms due to nerve lesions after treatment with Betaxin.

Gold treatment has been used by ZANETTI (p 634) and DE GOLOVINE (p 634) who report favourably on its effect on the general health.

IRVINE (p 342) reports unfavourably on sulphapyridine in leprosy.

BOENJAMIN (p 46) reports on the treatment of 7 patients with Reenstierna's antileprosy serum but makes it clear that the series is too small for definite conclusions to be drawn.

JORGENSEN (p. 343) reports very unsatisfactory results in the treatment of leprosy by means of the bettering hypertherm.

COCHRANE *et al* (p. 342) report success in the treatment of lepra reactions with foudadin, which is less toxic than tartar emetic. GERMOND (p. 635) also uses foudadin for the treatment of lepra reactions and has had success with sulphonamide drugs for the same purpose. RADVA (p. 47) states that blood transfusion is useful in the treatment of lepra reactions.

In the *International Journal of Leprosy* (p. 343) are collected records of the surgical removal of solitary leprids in 19 cases. There was no relapse in 12, but it is pointed out that such slight lesions often yield readily to medical treatment. DHARMENDRA and CHATTERJI (p. 343) found local relapse in 3 and general relapse in 1 of 18 cases in which early neuro-macular lesions had been excised, but the period of observation was too short to allow of definite conclusions.

COCHRANE (p. 635) gives details of the treatment he uses for trophic ulcers, and RYRIE (p. 636) refers to the excellent effect of dressings containing vitamin A on the ulcers of leprosy, giving details of the preparations used, which include shark liver oil. VESPOLI (p. 341) gives details of the treatment he uses for the ulcers of leprosy.

Since deformities of the hands and feet in neural leprosy are largely the result of paresis of the intrinsic muscles, OBERDORFFER and COLLIER (p. 47) advocate daily exercises to restore function. They give a formula for dressings to be used on ulcers.

Control

In South Africa, MUIR (p. 328) reports that the compulsory system has been modified to allow uninfected and recovered patients to be released, and that as a result good progress is being made. The Emjanyama institution in the Transkei is becoming so popular that more than one-third of the admissions are voluntary and these patients insist on receiving the compulsory treatment with gratifying results. In Basutoland a compulsory system is in force, one feature of which is the training of leprosy inspectors to search out the cases.

BRIDGCLIFFE (p. 634) states that in Nigeria there are now 14 settlements in 23 provinces and that the voluntary system of segregation has proved to be a great success. In the same country, MUIR (p. 328) reports that although compulsory segregation is impossible for financial reasons, a great deal has been done at small expense through the co-operation of missions with the Government. The Uzuakoli settlement has recently extended its work by establishing clinics in the surrounding villages. DAVEY (p. 48) describes the Uzuakoli leper colony in Nigeria, where 25 leper nurses have been trained to help in the work. Agriculture and industry are being developed and the colony is becoming more self-supporting. In the villages of the district the inhabitants are encouraged to segregate their cases locally and where this is done treatment is given each week by members of the Uzuakoli staff who visit the villages. By this means large numbers of patients are reached and contacts are known and observed. LANGAUER (p. 624) also comments on the success of the survey-propaganda-treatment system in Nigeria, as a result of which the Oshomo settlement has become very popular.

DELINOTTE (p. 636) describes the measures taken to control leprosy in the French colonies. These consist principally of registration

isolation in institutes of crippled or infective patients and treatment of closed non infective patients in their homes. Propaganda is provided for. In the Belgian Congo (p 637) 14,963 lepers are isolated in leprosaria of the agricultural colony type and 3 000 in villages or camps. MUIR and CHATTERJI (p 323) report on surveys carried out in a village in Bengal, from which it is deduced that voluntary home isolation of infective lepers was effective in preventing spread of infection over a period of 5 years.

AUSTIN (p 626) reports on the working of the compulsory system at Makogai Fiji and states that in agricultural institutions the co-operation of the patients may be obtained without any sense of grievance. He stresses the importance of the examination of family contacts.

LLERAS RESTREPO (p 344) urges the establishment of many more preventoria for the healthy children of lepers in Colombia. One has already been started but will maintain only 150 of the 2 000 healthy children in the leprosaria of the country.

In the opinion of MANALANG (p 48) leprosy is acquired chiefly if not entirely in childhood, and adults may be considered immune. [This may be true of indigenous peoples but that it is not universally true is suggested by the investigations of ARAUJO and DE ALBUQUERQUE (this *Bulletin* 1941 Vol. 38 p. 458) who found that adult immigrants to Brazil are as susceptible as Brazilian children.] Manalang therefore proposed a scheme in which adult lepers, in the Philippines who wish to return home may do so the money thus saved being used to isolate in government homes the children born to lepers. The council of Hygiene Manila could not however accept this extreme view and expressed a preference for the proposals made at the Cairo Congress.

Charles Wilcocks

PLAGUE

PRÉCIS OF ABSTRACTS IN THIS SECTION

In the Annual Report of the League of Nations Eastern Bureau (p 619) it is stated that in tropical countries plague tends to die out in lowlands and to spread to the cooler climate of mountain regions. Plague in India is briefly reviewed from 1900 onwards. In Java the recent remarkable decline in mortality is ascribed to house improvement and to the use of the Otten vaccine. In ports prime importance is attached not to the total number or species of fleas or the number of infected fleas but to the number of infective fleas, and this may depend entirely on climatic conditions.

RAO (p 620) has endeavoured to find the cause of the relative immunity of Calcutta from plague by making a rat flea survey in which he found that the flea indices are quite favourable to the spread of the disease in epidemic form. No explanation, therefore of the rarity of plague is yet available. GEORGE and TIMOTHY (p 621) examined rodents in a plague area in the Nilgiris S. India, but found plague in *R. rattus* only there was no proof of the existence of sylvatic plague but the enquiry is only in its preliminary stages. Of the fleas

found on field rats *Silvialius* and *Nosopsyllus nigrescens* are capable of transmitting plague. MAKAND (p. 621) reports on plague in the Central Provinces of India during 1939.

DAVIS (p. 622) states that plague is now enzootic in the rodent population over a large area of S. Africa. Human cases occur and it appears that *Mastomys coucha* and *R. rattus* now form reservoirs independent of gerbilles. A list is given of the principal fleas found on gerbilles and on *R. rattus*. The numbers of fleas in the burrows are controlled mainly by climatic conditions which fluctuate with the seasons. The numbers of fleas found on rats give no indication of the flea population of the burrows, and the author describes his method of counting the fleas in the burrows. VAN HOOFF (p. 623) reports two foci of sylvatic plague in the Belgian Congo. In one *R. rattus* is absent but many other rodents are found, in the other *R. rattus* is present.

In *Public Health Reports* (p. 623) is a record of a case of plague probably sylvatic in origin, in the United States. ACKERT *et al.* (p. 623) show that *X. cheopis* can overwinter on *R. norvegicus* in Kansas and is established there. Sylvatic plague is spreading eastwards and the field rodents may infect *R. norvegicus* against which measures should be taken.

MACCHIAVELLO (p. 624) states that in the north-east of Brazil rural plague is not primarily a disease of wild rodents, but is only epizootic in rats, especially *Rattus rattus*. It is spread by *Xenopsylla cheopis* which tends to leave rat nests only in the cool season and may transmit the disease to field mice and thence to wild rodents. He points out that in outbreaks of human plague associated with epizootics due to other organisms it may wrongly be assumed that the epizootics are due to plague. He describes a new syndrome stated to be due to plague.

D'AMATO (p. 624) names the places at which plague has recently been found in the Argentine. PARDAL (p. 625) reports a case of plague probably sylvatic in origin from that country. MOLL and O'LEARY (p. 625) state that in Chile plague is restricted almost entirely to ports. The climate south of Valparaiso seems to be unfavourable to *X. cheopis* and in the north the ports are surrounded by dry country with few rats and no fleas.

HARALSOV (p. 626) reports that Hawaii is still a centre for plague though it has disappeared from Oahu and Maui.

KAMAL (p. 626) writes of plague in Egypt and reports that in children enlarged glands, due to plague, are commonly seen in the absence of any other symptoms. In vaccinated persons he reports a case mortality of 25 per cent. in unvaccinated of 34.3 per cent. Treatment with large doses of serum gives good results. KAMAL *et al.* (p. 626) in Egypt do not entertain a high opinion of vaccination as a means of arresting an epidemic of plague, though they think that the fatality rate in bubonic plague is distinctly lower in the vaccinated than in the non-vaccinated. They refer to the spread of the disease by the faeces of pigeons, living in rat infested houses, which are used as manure. In treatment they advise serum with sulphapyridine.

MURDOCK (p. 627) refers to three outbreaks of plague in which the pneumonic form developed in cases of bubonic disease and to the danger of direct transmission of the pneumonic form. He describes the clinical progress and the steps which should be taken to protect attendants and to isolate the cases and their contacts.

JUNIOR and DE ALBUQUERQUE (p. 628) describe a skin test for plague in which an antigen from an infected lymph gland is used. The reaction appears to be valuable in retrospective diagnosis.

WAGLE *et al.* (p. 628) report on the treatment of 237 cases serum sulphapyridine and sulphathiazole each gave considerably better results than intravenous iodine but there is little to choose between the three first-named methods except that in septicaemia serum cannot be given in sufficient quantity because of the shock produced. CHOPRA *et al.* (p. 629) report the successful treatment of a case of plague with sulphapyridine.

In the *Journal of the Egyptian Public Health Association* (p. 629) are given the measures taken to diagnose deaths due to plague and to deal with outbreaks.

HOPKINS (p. 629) describes the anti plague measures taken in Uganda.

C II

SEVERN (A. G. M.) *Plague*.—*Med Press & Circular* 1941 July 23.
Vol. 206 No 4 pp 74-77

This is a brief general account of plague particularly in the East. Though there is nothing new in this paper to readers of this *Bulletin* recent work on the subject is mentioned particularly treatment with sulphonamides and prevention by living avirulent vaccine and by improved construction of buildings.

C III

LEAGUE OF NATIONS HEALTH ORGANISATION EASTERN BUREAU
SINGAPORE ANNUAL REPORT FOR 1940. pp 6-37 With 18
graphs & 2 maps. [11 refs.]—*Disease Incidence* —(A) *Plague*
(General) (B) *Plague in Countries*. (C) *Plague in Sea and Air*
Ports.

(A) *Plague (General)*—The spread of plague to other ports from Hong Kong in 1904 aroused attention to the possibilities of its dissemination by maritime trade. Expectations were not altogether borne out by experience and the explanation given for tropical and semi tropical countries is that plague tends to die out in lowlands and to spread inland where it may find an endemic home in the cooler climate of mountain regions. The history of plague spread in Java and in Madagascar confirms this point of view.

(B) *Plague in countries*—The countries referred to are British India Netherlands Indies Thailand Burma and China. Some very interesting graphs and maps are presented. In graph No 1 the plague cholera and smallpox deaths from 1900-1939 in British India are shown. This graph shows and especially by contrast how plague deaths have fallen in this period of time. They were 3 911 903 for 1900-04 and only 116 782 in 1935-39. Another interesting analysis relates to the incidence of plague in British India from 1924-38. Individual provinces showed marked differences favourable for the Punjab and Bombay but not so favourable for the United Provinces.

The outstanding features in this period are —(1) the fall in mortality of the country as a whole (2) the severe mortality in Punjab in 1924 and 1928 followed by its marked decrease and ultimate disappearance and (3) the steady mortality in United Provinces in the latter ten years of the period. The Netherlands Indies (Java) record a phenomenal decrease in plague deaths from 1934-1940. Two

DAVIS (D H S.) Some Ecological Methods in Research on Bubonic Plague.—*South African JI Sci* 1939 Vol. 36 pp. 438-444
[Summarized in *Rev Applied Entom* Ser B 1941 Apr Vol 29 Pt 4 pp 66-67]

Plague is now enzootic in the rodent population over a large area of southern Africa and cases in man, reflecting the minimum extent of this area, have occurred during the last 20 years in parts of eastern and north-western Cape Province the Orange Free State and borders of Basutoland, the southern and western Transvaal, Bechuanaland, South West Africa and Angola. Sporadic cases occur annually in widely separated parts of the Union mostly when the veldt rodent population has reached a peak and is being reduced by epizootics of plague. Until recently the main source of infection in man has been *Mastomys concha* but lately *Afms (Rattus) rattus* has been the source, particularly in the Orange Free State and on some occasions, large numbers of this rat have died without any traceable infection in the veldt rodents. It thus appears that *Mastomys concha* and *Afms rattus* are forming reservoirs independent of gerbilles.

Intensive ecological investigations were begun in September 1938 in an endemic plague area at Houtfontein in the northern Orange Free State with a view to devising quantitative methods of collecting data and of observing rodents and fleas in the field and to using the results of intensive work in this small area as a standard for comparison with conditions in other parts of the country. An outline is given of the methods used to estimate the fluctuation of population among gerbilles (*Tatera brantsii*) which is of importance for the determination of the exact point in the population's growth at which epizootics of plague and other diseases break out. The bases of the study are observations in the warrens, which are described, marking experiments and field observations and experiments on the reproduction of gerbilles. The chief fleas on *T. brantsii* in this area are *Chinopyllus ellobius ellobius* Roths and *Xenopylla eridos* Roths and *Chinopyllus rossii* Wtstr. and the chief species on *Af. rattus* is *X. brasiliensis* Baker. *D. ellobius* and *X. eridos* were occasionally taken on rats and *X. brasiliensis* on *T. brantsii*. As flea numbers are controlled mainly by climatic conditions, a fluctuation in the population is brought about by seasonal changes in the burrows and places where the fleas breed, and owing to the different characteristics of the various species there is also a fluctuation in their relative abundance. In plague investigations the degree of parasitism by fleas is usually expressed as the average number of fleas per rat examined (flea index). This, however, gives no indication of the flea population of the habitat of the host. By collecting all the fleas living in each burrow system of a warren the total number could be ascertained and related to the gerbilles inhabiting the warren and if the relation was shown to be constant, the flea-index would provide an estimate of the whole population. To collect the fleas, the entrances of all burrows appearing to form part of one system are marked, and the loose soil lying at the bottom of each burrow for one foot from the entrance is removed and kept in a numbered bag. The first foot is then dug away and a second sample taken, and this procedure is repeated until the whole system has been excavated. The position from which each sample is taken is marked on a plan as the work proceeds. The samples are then sifted and the fleas collected, and the dust is kept to allow any eggs, larvae or pupae

to develop. A description is given of an underground chamber where climatic conditions closely resemble those in gerbille burrows as indicated by records taken in an artificial burrow which is also described. fleas can thus be studied in it in their natural climatic environment.

CONGO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE
PENDANT L'ANNÉE 1939 [VAN HOOFF (L.)] —[Plague pp 14-15]

The two foci of sylvatic plague in the east of the Colony were active in 1939 that near Lake Albert produced 65 human cases of which 20 were septicaemic and 30 pulmonary. There was one case of primary plague meningitis. Prophylactic measures include rat destruction and the increasing use of the living E V strain for vaccination in 1939 8,871 natives were vaccinated without accident.

Two of the patients with pulmonary plague recovered after treatment with the sulphonamide preparation Astreptine but 10 others so treated died.

Rattus rattus is absent from this focus the rats concerned are of the genera *Leggada* *Arvicanthus*, *Lophuromys* *Otomys* *Lemniscomys* *Pelomys* and *Mastomys*. The fleas are *Xenopsylla* *Dimopsyllus* and *Ctenophthalmus*.

In the focus of Lake Edward there was a small epizootic and two native children were infected, one of whom recovered after treatment with sulphanilamide. In this area *R. rattus* is found, and 90 per cent. of the fleas are *X. brasiliensis*. C IV

PUBLIC HEALTH REPORTS 1941 Feb 28 Vol. 58 No 9
pp 399-400 —Plague Infection reported in the United States
during 1940.

During 1940 one case of human bubonic plague was reported in the United States. The patient was a boy of 13 living in Idaho and the locality is close to the eastern counties of Oregon which are known to be infected with rodent plague. The patient had been in contact with rabbits and carnivorous birds shortly before the onset of his illness. Details of plague in rodents and their parasites are given from five western States California Nevada Oregon Washington and Wyoming.

C IV

ACKERT (J. E.) BOLES (H. P.) & GRUNDMANN (A. W.) Oriental
Rat Flea established in Kansas.—*Science* 1941 June 13.
Vol. 93 No 2424 pp 566-567

Xenopsylla cheopis was found on specimens of *Rattus norvegicus* in Kansas in September 1940 and again at Manhattan Kansas in April 1941. This indicates that the flea can overwinter there and is established. The flea has been present in coastal cities since 1900 but has recently been reported from Indiana Iowa, Minnesota Illinois, Ohio and Tennessee. Its presence in Kansas together with the eastward spread of sylvatic plague make it evident that steps for control should be undertaken. Ground squirrels mice and cottontail rabbits may harbour *X. cheopis* but the principal hosts are rats. The field rodents being susceptible to plague are a potential menace to rats and measures against the latter are therefore necessary. C II

HAWAII, TERRITORY OF BOARD OF HEALTH. REPORT FOR FISCAL YEAR 1940 [HARALSON (M. F.)] pp. 79-81—Plague Control.

In the Territory of Hawaii plague seems to have disappeared completely from the island of Oahu as no case of plague has occurred there since 1910. On Maui neither human nor rodent plague has been found since December 1837 but the antiplague campaign is still vigorously carried on as a preventive measure. Hawaii itself is still a centre for plague. In one area 47 cases of rodent plague and one case of human plague were discovered during the year. Rat eradication by trapping and poisoning with banana phosphorus bait have been the chief plague measures employed.

Plague is not at present a problem on any of the islands other than those mentioned.

IV F H

KAMAL (Ahmed Mohamed) On the Epidemiology of Plague in Assiut Province in the Years 1938-1939.—*Jl. Egyptian Public Health Assoc* 1941 Jan 16th Year Spec No. pp 1-30

Plague is endemic in Egypt and cases of the disease occur nearly every year. This account of the epidemiology of plague deals with the particular towns and villages of the country. Excerpts of observations on some of these have decided interest. In the village of Awlad Elins 4 cases occurred in February and the whole village was vaccinated by the 9th March. In spite of this however a new case was reported on 14th March followed by others, making a total of 23 in April, with another 6 in May. Another interesting observation made is regarding the possibility of mild plague. In one epidemic for example it was customary to meet a large number of children with an enlarged gland or bubo sometimes tender, sometimes painless but with no other symptoms. In the author's opinion most if not all such cases are "inapparent" or ambulatory plague. He deals specifically with the effect of vaccination, but regards as vaccinated only those who had received two doses or in whom the three weeks considered necessary for establishment of immunity had elapsed. With this limitation in the numbers of the truly vaccinated a mortality of 34.3 per cent was found among the non-vaccinated and 25 per cent. among the vaccinated plague cases of Abu Tig district. Actual cases of plague were treated with serum in doses for the adult of 20 and 30 cc per day doses which were pushed higher still to as much as 50 cc and sometimes 80 cc. The results with big doses of serum are considered to be on the whole gratifying.

W F H

KAMAL (Ahmed Mohamed) GAYED (Ishac) & ANWAR (Mohd.) On the Epidemiology and Treatment of Plague in Egypt. "The 1940 Epidemic.—*Jl. Egyptian Public Health Assoc* 1941 Jan 16th Year Spec No pp 31-103 With 8 maps, 2 graphs, 3 figs & 41 charts

Plague history of recent times in Egypt begins in 1899 when the disease reached Alexandria. From that date it has appeared yearly. During 1940 Assiut Province was visited by a severe epidemic which was reported from five administrative districts. A very large proportion of the population of the epidemic areas seems to have been inoculated, 70,588 persons out of 84,518, and this with double the dose

used in previous years namely 1 000 million bacilli for the first dose and 2 000 million for the second. The authors recognize the necessity for putting any prophylactic vaccine method to an alternate case control. For this particular test they chose 19 villages and inoculated half families throughout 15 801 persons out of a population of 41 085 inhabitants. Unfortunately this interesting and important trial failed because plague did not attack the localities chosen. Their opinion however of vaccination en masse and during epidemics they are convinced that vaccination does not seem to be very high for neither reduces the chance of acquiring the disease nor stops the epidemic. They think that the fatality of bubonic plague is decidedly lower among the vaccinated than the non vaccinated.

One of the features peculiar to the epidemiology of plague in Egypt is its relation to the presence of pigeon houses put up by the inhabitants. The excreta of the pigeons is used for manure these houses are badly infested by rats and it is this which makes of them a real plague danger.

Among the interesting observations on the symptomatology of plague is the mention of tonsillar bubo plague meningitis and plague pyomyositis. A combined treatment of plague with serum and Dagenan [sulphapyridine] appears to have been superior to other forms of treatment.

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MURDOCK (John R.) *Pneumonic Plague in Ecuador during 1939* —
Public Health Rep 1940 Nov 22. Vol 55 No 47 pp
 2172-2178

The history of the three outbreaks of plague here described is interesting because of its significance for the occurrence of secondary pneumonia developing in the first instance on ordinary bubonic plague. Diagnosis may not be made immediately and the danger of transmission applies not only to friends and relatives of the patient but also to doctors and nursing sisters. These are features which are illustrated in all three Ecuador epidemics. A fairly common group of symptoms characterizes the illness — chills followed by headache fever general aches and prostration to begin with. After 24 hours appears a soft easy cough with little expectoration which is mucoid and becomes flecked with pus and then blood. The sputum is adhesive and stringy on microscopic examination it is found in most cases to show plague bacilli almost exclusively.

In the author's opinion outbreaks of pneumonic plague are almost always due to a case of bubonic plague which has developed secondary pneumonia but it is not always possible to establish the connection between the first pneumonic infection and the bubonic cases that produced it. Active steps should be taken as soon as the pneumonia is diagnosed to quell the outbreak. The best methods are — (1) To isolate rigidly the infected patients. (2) To quarantine all persons who have been in direct contact with the infected person. (3) To protect nurses and doctors in attendance by suitable head masks gowns and rubber gloves. (4) The careful disinfection and fumigation of quarters previously occupied by pneumonic plague patients. (5) House-to-house inspection of persons in infected sectors with temperature taken twice daily and isolation of all who show temperature regardless of cause.

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to use the thatch again. A useful precaution in these gassing operations is the provision of at least one gas mask. Apart from danger to the operating staff there is always the possibility that livestock bolting into the hut may have to be rescued after gassing has begun.

W F H

MEYER (K F) *Sylvatic Plague*.—*Amer Public Health Assoc. Year Book* 1940-1941 (Supp *Amer J Public Health* 1941 Mar Vol 31 No 3) pp 143-148

TRYPANOSOMIASIS

Prices of Abstracts in this Section

WALKER (p 631) states that the 20 054 cases of sleeping sickness discovered in Nigeria during 1939 represent an average incidence of 4 per cent of the natives examined, but that in the Benue province the rate reaches 6.7 per cent. In the miners of the Kabba florin goldfield the incidence is as high as 40 per cent. He gives information on the progress of control measures. VAN HOOF (p 631) reports on sleeping sickness in the Belgian Congo during 1939 when 12 886 new cases were discovered and 40 510 were under control.

JACKSON (p 632) reports further work on the study of marked *Glossina morsitans* observed in natural surroundings in Tanganyika Territory.

VANDERPLANK (p 632) records experiments which indicate that the transmissibility to *Glossina morsitans* and the virulence to the rat, of a strain of *Trypanosoma rhodesiense* may be enhanced by passage through animals with low mean body temperatures. HAWKING (p 633) examined strains of *T. rhodesiense* from untreated patients and from patients who had relapsed after treatment with trypanamide and found that the latter were more resistant to trypanamide than the former. It seems probable that this is an acquired resistance and is not due to previously resistant trypanosomes persisting and causing the relapses.

FRIEDHEIM (p 633) reports on the treatment of human sleeping sickness in West Africa with triazine arsenic acid. This drug can be given either intravenously or subcutaneously. Details of dosage in early and in later cases are given. The therapeutic effect in early cases was rapid sterilization of the blood and gland juice even after oral administration. In second stage patients there was reduction of cells and albumin in the cerebrospinal fluid, with clinical improvement. The period of observation of the 68 patients in whom the treatment was pursued was comparatively short, but the results so far are good.

STEWART (p 636) points out that in the Gold Coast the block method of clearing is insufficient to meet the needs of the Veterinary Department, though it is favoured by medical entomologists.

WORTON (p 636) has made a study of the mitochondria seen in certain species of trypanosomes.

Chagas's disease.—PACHCHANIAN (p 637) has succeeded, by the injection of suspensions of *T. cruzi* into rabbits, in producing serum which will agglutinate *T. cruzi* in high titre.

PEREIRA (p 638) describes a method of collection of faeces of Reduviid bugs for examination or for animal inoculation MARTINS (p 639) has shown that the new species *Triatoma arthurneovi* is capable of becoming infected with *T. cruzi*

DIAS (p 639) shows that cats and dogs which eat rodents infected with *T. cruzi* may themselves become infected, and states that they may also acquire infection by eating infected insects.

PIFANO and DIAS (p 639) in Brazil found bats infected with a trypanosome which could infect Reduviid bugs *Cimex hemipteris* and *Ornithodoros monibata* and which could be cultivated and used to infect laboratory animals Work is in progress to determine if this trypanosome is *T. cruzi*

MARTINS and TUPYNAMBA (p 639) give an account of two patients with Chagas's disease who presented Romana's sign

MAYER and PIFANO (p 640) have prepared from *T. cruzi* an antigen which they name cruzin and which when injected intradermally is apparently of great value as a rapid diagnostic agent C IV

NIGERIA. REPORT ON THE MEDICAL SERVICES FOR THE YEAR 1939
Appendix B pp 15-16.—Report of the Sleeping Sickness Service, 1939 [WALKER (G B) Acting Director of Medical Services]

During 1939 494 428 people were examined by the Sleeping Sickness teams and 20 054 cases were found an average of 4.0 per cent. chiefly in the Benue Province, where little work had been done before 1938 and where the incidence was as high as 6.7 per cent. In all 90 090 cases were given treatment In the Zaria Emirate where mass campaigns have been functioning since 1933 the total population has increased greatly and sleeping sickness is now only a fraction of what it once was There is a high incidence of a virulent type of disease in the miners of the Kabba Horin gold field, where the rate is as high as 40 per cent and it is thought that it was brought into the district by labourers from further north

The settlement schemes have made good progress, and most of the preliminary work on the fly-free corridor of 680 square miles has been done Limited clearing only will be necessary to free the northern parts from tsetse and movement of villages on a big scale will not be required Most of the tributary streams dry up in the dry season and barrier clearings are being made to prevent tsetse from spreading back during the rains from the permanent foci on the main rivers.

More than half the corridor has now been freed from tsetse and land for new settlements has been chosen carefully with a view to agricultural and pastoral development

The war interfered with sleeping sickness work and the number of teams was reduced to three but the dispensary system is being expanded to compensate for the reduction in mass treatment

C IV

CONGO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE
PENDANT L'ANNÉE 1939 [VAN HOOF (L.)] —[Trypanosomiasis pp 25-39 With 1 folding map]

Ten European cases of sleeping sickness were treated during the year 8 of these in the province of Léopoldville 1 in Lusambo 2 in Coquilhatville and 1 in Elisabethville. During 1939 all the

dosage of trypanamide than had Hawking's patients. Hawking does not state the size of the individual doses his patients received but presumably they were not more than 2 or 3 gm. per week for a 50-kilo man—the doses given by Yorke and Murgatroyd were considerably greater.]

Hawking states that the greater resistance of trypanosomes from patients who have relapsed may be explained in two ways—it may be acquired resistance obtained during the unsuccessful treatment with trypanamide or it may be natural resistance originally present and responsible for the relapse. Results of animal experiments suggest that the former is the correct explanation, and this is supported by one of Hawking's human cases whose trypanosomes were tested both before and after the second course of trypanamide—in this case it seems almost certain that a definite increase of resistance had occurred during this period.

The author made a few observations on patients who had relapsed after treatment with Bayer 205 but obtained no evidence that the trypanosomes from these patients exhibited an increase of resistance to this compound.

W. Y.

FRIEDHEIM (Ernst A. H.) L'acide triazine-arsénique dans le traitement de la maladie du sommeil africaine. Etude expérimentale et clinique [Triazine Arsenic Acid in the Treatment of Sleeping Sickness].—*Schweiz Med Woch* 1941 Feb 1 Vol. 71 No 5 pp 116-119

This paper gives the results of a clinical trial of an aromatic arsenical prepared by the author viz 2,4-diamino-6-(arsono-amino)-triazine. The di-sodium salt of this substance, which for the sake of brevity has been called triazine arsenic acid (No. 4289) is a white crystalline powder containing 20.2 per cent of arsenic and is soluble in water to the extent of a 33 per cent solution. In the dry form it is stable and does not change when kept for four months at a temperature of 65°C. The solution is stable during a period of three months at 45°C.

In preliminary biological observations the author examined the toxicity of the substance for mice. It was found that doses of 0.75 and 1.0 gm. per kilo given intravenously killed respectively 10 per cent and 20 per cent of the animals. When the drug was given by the mouth, mice stood 10 gm. per kilo without any inconvenience. Rabbits tolerated a dose of 0.75 gm. per kilo intravenously and dogs about 0.2 gm. per kilo. In the following table the author compares the trypanocidal action of his new compound viz No. 4289 with that of trypanamide in *T. equiperdum* infections of mice—

	Min Cur Dose gm./kgm.	Max Tol Dose gm./kgm.	Therapeutic Index
Trypanamide intraperitoneally	0.4	2.25	5.6
4289 intraperitoneally	0.03-0.05	1.5	circa 30

From this it appears that the new substance is about eight times more active than trypanamide, and that its therapeutic index is

considerably greater. Experimental intoxication does not produce the phenomenon of waltzing mice *etc* signs of nervous lesions as is the case with tryparsamide. The maximum tolerated dose varies with the volume of liquid injected and with the quantity of water absorbed by the mouse after the injection.

In 1939 the author had an opportunity of visiting French West Africa and of testing his substance on 89 cases of human trypanosomiasis. His work was divided into three stages *viz* (1) to establish under good hospital and laboratory conditions on a limited number of cases the trypanocidal effect and essential facts regarding the posology and pharmacology of the preparation (2) to establish on a more considerable number of cases the facts obtained in his preliminary investigations to study more particularly the effect of the preparation on the changes in the cerebrospinal fluid and finally to establish a standard routine of treatment applicable to conditions in the bush (3) to examine all the patients treated six months to a year after the end of treatment.

The first part of this programme was carried out in the neighbourhood of Dakar and the second part in the interior of the Ivory Coast at the trypanosomiasis school of Ouagadougou. The third part has been prevented by the outbreak of war.

The drug can be given either intravenously or subcutaneously with practically the same results. For patients in the first stage of the disease the author recommends doses of 0.03 gm to 0.5 gm per kilo with a maximum of 2 gm every third day. The course of treatment consists of 10 injections during a period of about 30 days. It is important to commence treatment in second stage cases exhibiting signs of meningo-encephalitis with small doses given subcutaneously. In such cases a first dose of 0.03 gm per kilo which is perfectly tolerated by first stage cases may be followed by a severe reaction with an aggravation of all the encephalitic symptoms. This veritable crisis is analogous with a Herxheimer reaction. A week later when it has passed the patient will be able to tolerate the usual course of treatment without inconvenience.

The author recommends the following plan of treatment in second stage cases: first subcutaneous injection 0.01 gm per kilo, second subcutaneous injection 0.02 gm per kilo, third subcutaneous injection 0.03 gm per kilo, fourth injection which can be given either subcutaneously or intravenously 0.03 gm per kilo, and the fifth and following injections either subcutaneous or intravenous 0.03-0.04 gm per kilo. Eleven patients in whom the cerebrospinal fluid contained 87-846 cells per cmm and eight cases with trypanosomes have been treated in this way without any inconvenience or accident.

The only toxic effects observed after large doses of the drug were gastro-intestinal disturbance *etc* vomiting, colic, diarrhoea and arsenical dermatitis; these disappeared quickly when the drug was stopped. Albuminuria and disturbance of vision were never seen.

Therapeutic effects.—All the 76 cases treated parenterally with the compound became negative after the first injection. In 32 of them peripheral sterilization was observed 24 hours after the first injection. Twenty nine cases have been re-examined 2½ to 9 (mainly 6 or 7) weeks after the end of treatment; these examinations showed the patients to be clinically cured and free from parasites. The effect on the pathological changes in the cerebrospinal fluid exhibited by 19 second stage cases is shown in a table. The drug produced a rapid

in Tyrode solution and washed several times. Finally a suspension of the washed trypanosomes was made in Tyrode solution of such a strength that 1 cc. contained about 2,000,000 trypanosomes.

For immunization the suspension was killed by adding 0.04 per cent. of formalin. The stock was divided into a number of tubes and kept at 4°C. Rabbits and a rooster were immunized by the injection of 1 cc. of the antigen every 2 or 3 days until 7 to 9 injections had been given. One rabbit was injected intraperitoneally and 5 rabbits and the rooster intravenously. The agglutination titre was determined at intervals, and after it had reached about 1 in 1,000 the subsequent 18 to 24 inoculations were made once or twice a week with living *T. cruzi* suspensions. The agglutination titres are shown in a table.

Agglutination tests.—The serum of the animals to be examined was diluted with Tyrode solution. Each serological tube contained 0.5 cc. of diluted serum and an equal quantity of freshly prepared live *T. cruzi* suspension (over 2,000,000 trypanosomes per cc.) Care was taken to have an even suspension and to eliminate all clumps. The tubes were shaken and kept at 37°C. for 30 minutes when readings were made.

The following is the summary:—

* 1 *Trypanosoma cruzi* on the medium of Novy and MacNeal grew luxuriantly and formed colonies. From such cultures desired amounts of micro-organisms were removed and used for serological and immunological studies.

* 2 Anti-*cruzi* serum with a titer of over 1:250,000 was obtained in one instance by the injection of rabbits with washed trypanosome cultures. The first injections consisted of formalinized antigen while the subsequent injections (10 to 30) were live suspensions of washed *T. cruzi*.

* 3 *T. cruzi* antigen (culture) was agglutinated by the serum samples from animals infected with *T. cruzi* in dilutions of 1:256 to 1:1,024 but with the sera of animals infected with nagana or murrina, the maximum titer of agglutination was 1:32.

* 4 The California strain of *T. cruzi* (cultured from *Triatoma protracta*) agglutinated with the anti-trypanosome sera of the Panama strain (cultured from *Triatoma protracta*) in very high dilutions.

IV 1

PEREIRA (C.) Upon the Detection of *Schizotrypanum cruzi* (Chagas, 1909) Infection in Reduviid Bugs.—*Idem* Jubilate Prof. Saito Yoshida Osaka Japan. 1939 Vol. 2 pp. 365-367 [Summary taken from *Iet Bull.* 1941 Aug Vol. 11 No 8. p. 503. Installed E. S.]

The lid of a 9 cm. x 3 cm. Petri dish is lined with filter paper. The bottom of a 3 cm. x 1 cm. dish is sealed with paraffin wax close to the side of the bottom of the larger dish, and is filled with water in order to maintain a moist atmosphere.

A reduviid bug suspected of carrying *Trypanosoma cruzi* may be transferred immediately after feeding to the filter paper lining. The lid may then be carefully inverted and placed over the dish. The bug will crawl about very slowly so that the drops of faeces fall separately to the bottom, where they remain undried till needed.

Material so obtained may be examined immediately for trypanosomes, or may be utilized for animal inoculation, vital staining or permanent preparations.

MARTINS (A. Vianna) Infecção experimental do *Triatoma arthur-neivai* Lent e Martins 1940 pelo *Schizotrypanum cruzi*
 [Experimental Infection of *Triatoma arthur-neivai* with *Trypanosoma cruzi*].—*Brasil Medico* 1941 Mar 1 Vol. 55 No 9 p 131

LENT H & Martins A V reported finding in 1940 a new species of *Triatoma* in Minas Geraes to which they gave the name of *T. arthur-neivai*. They caught several but found none infected naturally with *T. cruzi*. Fresh captures having been made larvae at different stages were allowed to feed on a laboratory assistant who was infected with the chronic form of Chagas's disease. All of them became strongly infected with the trypanosome. H H S

DIAS (Emmanuel) Serviço de estudos das grandes endemias Transmissão do *Schizotrypanum cruzi* entre vertebrados por via digestiva [Transmission of *T. cruzi* among Vertebrates by the Alimentary Tract].—*Brasil Medico* 1940 Nov 23 Vol. 54 No 47 p 775

An adult cat was fed on infected camondongos and 17 days later trypanosomes were found in its peripheral blood. In the course of three months 35 or more of the rats were eaten and by this time the cat's blood was swarming with the parasites. There is little if any doubt that cats and dogs which eat rodents and other small sylvan mammalia become infected and so become intermediaries from which human infection may occur. Also animals e.g. cats may become infected by themselves devouring infected insects, or the smaller mammals which have infected themselves in this way. H H S

PIFANO (Felix) & DIAS (Emmanuel) Parasitismo natural do morcego *Carollia perspicillata* por um *Schizotrypanum* na Venezuela [Natural Infection of *Carollia perspicillata* by a Trypanosome in Venezuela].—*Brasil Medico* 1940 Oct. 19 Vol. 54 No 42, pp 695-696

The bat, *C. perspicillata* was the first of the chiroptera to be found in the New World with blood flagellates. The authors have recently examined 30 specimens and found four to be harbouring trypanosomes in the leishmania stage readily seen in sections of the heart or stomach. Two of the four inhabited a cottage highly infested with *Rhodnius prolixus*. Xenodiagnostic tests proved positive with *R. prolixus*, *Triatoma maculata*, *T. nigromaculata*, *T. infestans*, *T. sordida*, *Panstrongylus megistus*, *P. geniculatus*, *Psammolestes arthuri*, *Cimex hemipterus* and *Ornithodoros montium*. The protozoon was cultivable readily on NNN and Noguchi's medium by sowing with the blood of the bat or of animals experimentally infected and laboratory animals, guinea pig, dog or camondongo acquired infection from the insects or by inoculation with culture or by animal to animal passage. Work is to be undertaken to prove whether the flagellate is *T. cruzi*. H H S

MARTINS (A. Vianna) & TUPYNAIRA (Antonio) Sobre dois casos agudos de molestia de Chagas observados em Minas Geraes, Brasil [Two Acute Cases of Chagas's Disease in Minas Geraes, Brazil].—*Brasil Medico* 1940 Dec. 21 Vol. 54 No 51 pp 839-841

The authors give details of two patients, males aged 16 and 46 years who presented Romaña's sign. One acquired the infection in Grão

MULLIGAN *et al* (p 647) show that serum obtained from monkeys which have recovered from infections with *P. knowlesi* has a protective action in infections with that parasite especially in monkeys whose lympho-macrophage system has previously been stimulated by infection with *P. cynomolgi*. The conclusion is that the defence mechanism against malaria involves the interaction of both cellular and humoral agencies. They (p. 648) found similar results with the use of extracts of malarial spleens in place of immune serum.

The same authors (p 648) found that although *P. knowlesi* infection in *Silenus sinicus* is not so severe as in *S. rhesus* it may be so if the spleen is first removed from *S. sinicus*. Immunity acquired by a first attack may be appreciably lowered by subsequent splenectomy. *S. sinicus* possesses high natural immunity against *P. cynomolgi* which is but little altered by splenectomy. The greater the natural immunity therefore the more it is due to some inherent quality of body fluids or tissues. Acquired immunity is largely removed by splenectomy but that part which is due to antibodies in the blood remains. In defence against malaria there are three factors— inherent quality of the host, cellular mechanism and specific humoral factor.

MULLIGAN and SWAMINATH (p 650) have found *P. vivax* infection in a monkey in India for the first time.

GINGRICH (p 650) reports experiments on birds which lead to the conclusion that natural immunity is due to some factor other than phagocytosis but that acquired immunity is due to active phagocytosis. He (p 650) has produced a degree of immunity in canaries by means of a vaccine prepared from blood infected with *P. cathemerium* this immunity is probably due to activation of the lympho-macrophage system.

MAXWELL *et al* (p 651) found that sulphapyridine is effective against *P. circumflexum* but not against *P. relatum* var *matutumum* and *P. nucleophilum*.
C IV

RUSSELL (Paul F) & RAO (T Ramachandra) Natural Malaria Infections in Some South Indian Anophelines, with Special Reference to *A. culicifacies*.—*Jl Malaria Inst of India* 1940. Dec. Vol. 3 No 4 pp. 543-562 [28 refs.]

This is an analysis of the results of the dissection of 36 414 *Anopheles* during three years in the Pattukkottai Taluk, Tanjore District, South India. The authors have previously described the epidemiology of malaria in this area this *Bulletin* 1939 Vol 36 p 131. With the exception of isolated infections in *A. subpictus* and 4 *reges* this *Bulletin* 1939 Vol 36 p 1005] infected *Anopheles* were all *A. culicifacies*. The sporozoite index of *A. culicifacies* was only 0.061 per cent. but this is apparently sufficient to account for average spleen and parasite indices of over 40 and 30 per cent respectively.

Norman White

OGURTSOVA (A. S.) Malarial Coma.—*Neuropathologia et Psychiatria* [Neuropathology and Psychiatry] Moscow 1940 Vol 9 No. 1-2 pp 42-46. [In Russian.]

The author analyses three fatal cases of malarial coma, using the observations for the elucidation of the pathogenesis of malarial

affections of the central nervous system. While the *post mortem* appearance of the organs revealed the malarial nature of the cerebral disorder this had not been established clinically in any of these cases.

A detailed account is given of the changes found in the brain. Microscopical examination showed profound and diffuse changes in the whole cerebral tissue manifested mainly in vascular disturbances of the capillary network and small vessels (thickening of the walls desquamation of endothelium impregnation of walls and blocking of lumen with pigment haemorrhages). The circulatory disturbances produced parenchymatous changes in the nerve cells. Since the pathologico-anatomical picture in malaria generally points to progressive degenerative changes in the reticulo-endothelial system leading to changes in its function the author suggests that malarial coma is due to heavy invasion by parasites of the cerebral capillaries accompanied by a general or local depression of the R E S.

The heavy impregnation of the capillaries with pigment reveals the difference between the vascularization of the different elements of the brain. While in the white matter capillaries are scanty with few branches in the grey matter they form a highly developed network. This difference determines some of the clinical manifestations and histopathological changes in malarial coma. Since compensations in the circulation are more easily affected in the cortex, haemorrhages and necrotic changes are absent in this region. On the other hand the greater extension of the capillary system in the cortex provides a wider field for the toxic activity of the parasites which results in the diffuse affection of the grey matter and the grave symptoms observed in malarial coma.

The blocking of the peripheral parts of the vascular system with pigment by causing stasis in the network leads to a reduction of the blood pressure and diapedetic haemorrhages resulting in cardiac weakness which was a marked feature in all the cases observed.

C A Hoare

MALKIEL (B. P.) Histopathological Characteristics of Malarial Encephalitis.—*Neuropathologia et Psychiatria* [*Neuropathology and Psychiatry*] Moscow 1940 Vol 9 No 1-2 pp 47-56. With 9 figs. [In Russian.]

An account is given of seven cases of malarial coma with a fatal termination five of which had subtertian one subtertian and benign tertian, and one quartan malaria. The *post mortem* findings in the brain are described and discussed in detail, and the following conclusions are drawn —

(1) In all the cases parasites and pigment were present while alterative exudative and proliferative phenomena were observed both in the soft membranes and in the brain tissue the pathological process in the cranial cavity therefore represents meningo-encephalitis of malarial origin.

(2) Granulomata found in malarial meningo-encephalitis show considerable resemblance to the nodular aggregations of glial and mesenchymal elements in other types of infectious encephalitis.

(3) Malarial coma is associated with the presence of widespread meningo-encephalitis.

(4) The granulomata—which are characteristic but not specific in malarial coma—comprise glia, Hortega's cells and other mesenchymal elements.

(5) The granulomata are localized chiefly in the white matter of the cerebral hemispheres in the corpus striatum, the internal capsule nucleus dentatus of the cerebellum and sometimes in the subependymal region. They did not occur in the cortex of the cerebrum or cerebellum nor in the white matter of the latter.

(6) The course of malarial coma usually manifests a parallelism between the clinical and pathological processes. C. A. Hoare

BHATTACHARJEE (Jagadish C.) Cerebral Malaria—an Afebrile Case with Epileptiform Convulsions.—*Indian Med Gaz* 1941 Mar Vol 76 No 3 pp. 159-160

A Nepali motor driver aged 38 after driving 11 miles suddenly fainted. He was brought to hospital completely unconscious. Soon after admission he had an epileptiform seizure characterized by tonic spasm of the muscles with conjugate deviation of the head and eyes to one side. This was followed by clonic spasm and then complete relaxation. The whole seizure lasted about three minutes. Similar fits recurred every 10 to 15 minutes. Blood films showed a heavy infection with ring forms of *P. falciparum*. He was given an intravenous injection of quinine hydrochloride 10 grams in 20 cc glucose solution with adrenalin. He died of exhaustion six hours after admission. N. H.

SARKAR (S. K.) A Case of Malarial Psychosis.—*Indian Med Gaz* 1941 Mar Vol 76 No 3 p. 159

A youth aged 18 was brought to hospital mentally deranged. He had been ill with fever for four days. He was completely disoriented about time and place and sometimes could not recognize his parents. He looked very ill. The day after admission to hospital his temperature rose to 104°F. Blood examination revealed the presence of a few *P. falciparum* rings. Treated with quinine he made a rapid and complete recovery. When he became rational he remembered nothing about his illness. N. H.

MOST (Harry) & TEWKSBURY (Margaret H.) Laboratory Studies in the *Falciparum* Malaria of Drug Addicts.—*Jl. Lab. & Clin. Med* 1941 Mar Vol 26 No. 6 pp. 1034-1039

Epidemiological and clinical studies of *P. falciparum* malaria among drug addicts in New York City and the treatment of such cases, have been the subject of previous publications (this *Bulletin* 1941 Vol 38 pp. 174-175). The present contribution is concerned with laboratory studies of the clinical pathology of the condition. In half the cases there was considerable anaemia. macrocytosis was commonly observed, attributable possibly to insufficient diet or liver damage. The white blood cell count was normal in half the cases, and raised in most of the remainder. monocytosis was not common. Two-thirds of the patients had hyperbilirubinaemia. In these cases the van den Bergh reaction was of the direct immediate type. Serum albumin was reduced, and the albumin-globulin ratio was reduced or inverted. In some cases serum globulin was markedly increased. There was a high incidence of positive Wassermann reactions. Henry's flocculation test was positive in all of the 25 cases in which it was used. In many patients the amount of urobilinogen in the urine was increased. [See also this *Bulletin* 1940 Vol. 37 p. 789] V. H.

NANDI (B K) Observations on the Respiratory Metabolism of Tissues in the Presence of Plasmoquine.—*Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 475-493 With 3 graphs.

This paper describes the oxygen uptake of guinea pig spleen liver brain blood and cell free enzymatic extract of liver in the presence of plasmoquine as measured with Barcroft differential manometers. The stimulation of oxygen uptake was most marked in the case of blood with a concentration of plasmoquine as low as 1 in 300 000 the coefficient of stimulation was 41 per cent. Normal tissues which destroy the least amount of plasmoquine suffer the highest respiratory stimulation. The phenomenon of stimulation of oxygen uptake by tissues in the presence of plasmoquine is an enzymatic (thermo-labile) reaction the decomposition of plasmoquine takes place mainly through thermo-stable systems present in the tissues.

N W

RUSSELL (Paul F) & KNIFE (Fred W) Malaria Control by Spray-Killing Adult Mosquitoes. Second Season's Results.—*Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 531-541 With 4 figs on 2 plates.

This is a continuation of the work in the village of Kasangadu Pattukkottai Taluk, Tanjore District, Madras [this *Bulletin* 1940 Vol 37 p 504] In all, 548 buildings housing 1,805 persons were sprayed once a week for 29 weeks from June 1939 to January 1940. As before the spray used was 19 parts kerosene and 1 part pyrocyde 20. Seventy-six of the buildings were sprayed a second time each week. The only important modification of technique in the second year was the systematic spraying of the outside of each house under the eaves before the house was entered this appeared to trap mosquitoes inside. The amount of spraying mixture used was 0.300 litre per 10 000 cubic feet sprayed. The total cost worked out at just below one rupee per head of population per season. A near by village comparable in all respects acted as a control. The beneficial effect of spraying is shown by spleen and parasite indices determined in November of each of the three years 1937 to 1939 these November surveys were made just after the peak of the malaria season. The November spleen indices in Kasangadu were 67.8 24.0 and 14.4 as compared with 54.5 61.0 and 57.4 in the control village. The corresponding parasite indices were 57.1 11.5 and 6.2 in Kasangadu as compared with 45.5 52.0 and 47.5 in the control village. In February 1940 no parasites were found in 24 infants less than a year old in Kasangadu in the control village 5 infants out of 22 were harbouring parasites.

The method is effective in greatly reducing malaria transmission. The cost is less than anti-larval work in the same area would be but it is high in relation to the economic level of the community. N W

CHOPRA (R. N) ROY (D N) & GHOSH (S M.) *Blumea densiflora* and *Artemisia vulgaris* their Insecticidal and Larvicidal Properties.—*Jl Malaria Inst of India* 1940 Dec. Vol. 3 No 4 pp 495-498

Blumea densiflora grows in North India at elevations of from 2,000 to 4,000 feet. Neither the aqueous, acetone nor kerosene extract

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Blumea densiflora grows in North India at elevations of from 2,000 to 4,000 feet. Neither the aqueous, acetone nor kerosene extract

of the leaves exhibited any appreciable larvicidal or insecticidal properties that could be attributed to the plant. The essential oil of *Ariemisia vulgaris*, which grows abundantly in hilly districts in India, has insecticidal and larvicidal properties comparable with those of kerosene. kerosene is a feeble insecticide though a good larvicide.

A. H.

PASSMORE (R.) & SOMMERVILLE (T.). An Investigation of the Effect of Diet on the Course of Experimental Malaria in Monkeys.—*Jl. Malaria Inst. of India*. 1940 Dec. Vol. 3 No. 4 pp. 447-455 [11 refs.]

It has often been stated that malaria runs a more severe course in people who are ill-nourished and in poor health than in those who are well fed and healthy. As such statements are matters of opinion rather than the result of controlled experiments the authors decided to make observations on the course of monkey malaria in well-fed and under fed animals. Monkeys (*Macacus radiatus* syn. *Silversia swinhoei*) were kept for varying intervals on two different diets. In the one there was a resemblance to a good human lacto-vegetarian diet as consumed by certain groups in India. It was based on whole wheat and contained liberal amounts of pulses, vegetables fruits and milk. The other diet resembled that of poor rice eaters all over India. Its main ingredient was parboiled milled rice and only small amounts of pulses, vegetables and fruits but no milk, were included.

The monkeys on the first diet put on weight and remained in excellent condition, while those on the poor diet lost weight steadily some dying within 6 or 8 weeks. The majority however survived for 6 to 12 months and then died, after suffering for several weeks from diarrhoea associated with inflammatory or degenerative changes in the small intestine. The monkeys of the first group were active and playful, while those of the second group were listless and uninterested in their surroundings. The two groups were thus clearly differentiated. When animals in the two groups were infected with malaria by the injection of equal doses of parasites (*Plasmodium knowlesi* or *P. cynomolgi*) there was little if any difference in the reaction. The course and severity of the primary attacks of malaria were unaffected by the differences in the state of nutrition of the monkeys.

C. M. Wemyss.

MULLIGAN (H. W.) RUSSELL (Paul F.) & MOHAN (Badri Nath). Specific Agglutination of Sporozoites.—*Jl. Malaria Inst. of India*. 1940 Dec. Vol. 3 No. 4 pp. 513-524

A preliminary note concerning sporozoite agglutination in the presence of different sera was published in June 1940 [this *Bulletin* 1941 Vol. 38, p. 338]. Details of this and of subsequent work are now reported. Observations were made with sporozoites of *P. gallinaceum* in *Armigeres obsoletus*, *Armigeres kochingensis* and *Aedes albopictus* with sporozoites of *P. praecox* in *Culex gelidus theileri* and *whitmorti* and with sporozoites of human malaria probably *P. malariae* in wild *A. fluviatilis*. Only salivary glands which contain large numbers of sporozoites are suitable for this work. Care must be taken to distinguish close packing of excessive numbers of sporozoites and true agglutination. pressure on the cover-slip enables this to be

done with ease. When the serum has a powerful action agglutination is apparent immediately after dissection in high dilutions of less potent sera there is a time-lag. In the authors' experiments the observations were recorded within a time limit of 15 minutes.

The sera of many species of normal animals agglutinate sporozoites of *P. gallinaceum* in dilution of 1/16 normal saline but no normal serum diluted 1/128 caused agglutination. The serum of fowls with chronic or latent infections of *P. gallinaceum* agglutinated the sporozoites of this species in dilutions of 1/4 000 in most cases and in one case in a dilution of 1/16 000. The serum of a *rhesus* monkey with a chronic *P. cynomolgi* infection agglutinated sporozoites of *P. gallinaceum* in a dilution of 1/128. Similar results were obtained with the serum of a *rhesus* monkey with a long-standing *P. inui* infection. The serum of a human patient with chronic malaria agglutinated sporozoites of *P. gallinaceum* in a dilution of 1/64. dilutions of normal human serum above 1/16 caused no agglutination.

Sera from sparrows with low grade infections of *P. praecox* agglutinated homologous sporozoites in dilutions up to and over 1/8 000.

The serum of a human patient long resident in a hyperendemic malaria locality agglutinated the sporozoites of human malaria in wild *A. fluviatilis* in dilutions up to 1/8 000 and the serum of another similar case in dilutions up to 1/4 000.

The experiments indicate that sporozoite agglutination in high dilutions of malarial serum is a specific reaction. N W

DIKSHIT (B B) & GANAPATHI (K) Sulphathiazole in Monkey Malaria. —*Jl Malaria Inst of India*, 1940 Dec. Vol. 3 No 4 pp 525-529 With 1 graph. [11 refs]

The authors have tested the action of sulphathiazole in *Plasmodium knowlesi* infections in monkeys (*Macacus rhesus*) which as is well known invariably progresses in intensity up to the death of the animal. It was found that the oral administration of a single dose of half a gramme of the drug to monkeys with a moderate infection would bring about the disappearance of the parasites from the peripheral blood. Radical cures were obtained by giving three grammes during three days the parasites disappearing from the blood in four to six days. C M W

MULLIGAN (H. W) SOMMERVILLE (T) & SWAMINATH (C S) Cellular and Humoral Agencies in Defence against Malaria.—*Jl Malaria Inst of India* 1940 Dec. Vol 3 No 4 pp 563-579 [17 refs]

The experiments recorded in this paper relate to attempts made to modify the course of *Plasmodium knowlesi* and *P. cynomolgi* infection in *S. sinicus* and *S. rhesus* by the administration of homologous serum obtained from monkeys which had recovered from infections or had been rendered hyperimmune. It was possible to modify *P. knowlesi* infection in normal *sinicus* and *rhesus* monkeys by the administration of immune serum to a slight extent in some cases only. No evidence was obtained of any modification of *P. cynomolgi* infection in *sinicus* monkeys nor of *P. knowlesi* infection in splenectomized *sinicus* monkeys. On the other hand there was definite evidence that administration of immune serum to *rhesus* monkeys infected with *P. knowlesi* definitely

controlled the infection, provided the lymphoid-macrophage system had been previously stimulated by a *P. cynomolgi* infection. It has been shown by several observers that *rhesus* monkeys which have recovered from *P. cynomolgi* infections are as susceptible to *P. knowlesi* infections as are normal monkeys and this in spite of the fact that the *P. cynomolgi* infections bring about a hypertrophy of the lymphoid-macrophage system. The degree of the hypertrophy or stimulation of the system is in direct proportion to the intensity of the infection. If such monkeys with a stimulated lymphoid-macrophage system are inoculated with *P. knowlesi* this infection progresses to a fatal termination, as in normal monkeys. On the other hand, if immune serum is administered as soon as parasites appear in the blood, infection is controlled to such an extent that a high percentage of monkeys survive. The immune serum is thus definitely protective, the protection being most evident in those monkeys which had experienced the most intense *P. cynomolgi* infection, and thus the greatest stimulation of the lymphoid-macrophage system. The conclusion is that the defence mechanism against malaria involves the interaction of both cellular and humoral agencies.

C. M. W.

MULLIGAN (H. W.) SOMMERVILLE (T.) & SWAMINATH (C. S.). Attempts to control Malarial Infections in Monkeys by the Administration of Spleen Extracts.—*Jl. Malaria Inst. of India* 1940. Dec. Vol. 3 No. 4 pp 581-590.

The experiments recorded in this paper are similar to those described in the paper just reviewed. They differ in that saline extracts of malarial spleens were administered intraperitoneally in place of the immune sera. The results are very much the same and are compatible with the view that immune substances occur in the spleen as they do in the peripheral blood. There was no evidence that immune bodies were present in the spleen in very much greater concentration than they were in the blood. The monkeys employed were *S. rhesus* and *S. sinicus*, while the parasites were *P. knowlesi* and *P. cynomolgi*. As with the immune serum experiments the most definite results were obtained with *P. knowlesi* infections in *rhesus* monkeys which had recovered from a previous *P. cynomolgi* infection and which could be presumed to have a stimulated lymphoid-macrophage system.

C. M. W.

MULLIGAN (H. W.) SOMMERVILLE (T.) & SWAMINATH (C. S.). The Effects of Splenectomy on Natural and Acquired Immunity in Monkey Malaria.—*Jl. Malaria Inst. of India* 1940. Dec. Vol. 3 No. 4 pp 591-601.

In this paper the authors describe experiments on malarial infections due to *Plasmodium knowlesi* or *P. cynomolgi* in the monkey *S. sinicus* subjected to splenectomy. Infections due to *P. knowlesi* in normal monkeys vary from mild to severe. Most monkeys after inoculation develop a mild infection followed by spontaneous recovery while about 25 per cent. acquire heavy infections causing death. Splenectomized monkeys react much more severely as shown by the death in the primary attack of 11 of 13 while one of the two which survived the primary attack died from a relapse. At the same time the rate of

increase of parasites in the blood and the intensity of the infection were much greater than in normal monkeys. It thus appears that the splenectomized *S. sinicus* reacts to *P. knowlesi* infections much as intact *rhesus* monkeys do.

Infections due to *P. cynomolgi* in normal *S. sinicus* are mild and transient in most cases. Splenectomized monkeys are somewhat more susceptible as evidenced by a greater intensity of infection (three per cent. of red cells infected in place of under one per cent.) but on the whole it can be concluded that the high degree of natural resistance to the infection is not influenced by removal of the spleen. In the case of splenectomy carried out from 11 to 178 days after the crisis it was found that with *P. knowlesi* infections relapses occurred which were more severe than the primary attacks in normal monkeys but less severe than primary attacks in splenectomized ones. It can be concluded that the immunity acquired by a primary attack is appreciably lowered but not entirely removed by splenectomy. When the same procedure was adopted for monkeys recovered from *P. cynomolgi* infection only 8 of 10 monkeys relapsed but in these the infection was more severe than primary attacks in unsplenectomized monkeys and was comparable with the primary attacks in splenectomized monkeys.

From the results obtained it would appear that *S. sinicus* possesses a high degree of natural immunity to *P. cynomolgi* and as this is hardly interfered with by the removal of the bulk of the lymphoid macrophage system by splenectomy it is dependent upon inherent unsuitability of the body tissues or fluids for the development of the parasite. The natural resistance of the monkeys to *P. knowlesi* is less than to *P. cynomolgi* but most of it is removed by splenectomy, an indication that the ineffective natural immunity is dependent upon the lymphoid macrophage system and not upon some inherent unsuitability of the tissue of the host. The conclusion can be drawn that the greater is the degree of natural immunity the more is this due to some inherent quality of the fluids or tissues of the body and the less to the lymphoid macrophage system.

It has already been shown that *S. sinicus* after recovery from *P. knowlesi* infections is highly resistant to superinfections and that this is associated with well-marked hypertrophy of the lymphoid macrophage system of the spleen as well as the presence of antibodies in the blood. Relapses produced by splenectomy were more severe than primary attacks in normal monkeys but less severe than those attacks in splenectomized monkeys. It can therefore be inferred that though the acquired immunity is largely removed by splenectomy that part of it which is due to the presence of antibodies in the blood remains. With *P. cynomolgi* infections there is little evidence of hypertrophy of the lymphoid-macrophage system for the natural immunity is so well developed that little acquired immunity is necessary to overcome the primary attack. In accordance with this removal of the spleen in recovered monkeys removes little acquired immunity with the result that the relapse corresponds with primary attacks in splenectomized monkeys.

The general conclusion is that in defence of the organism against malaria there are three agencies at work—firstly an inherent quality of the host which is inimical to the development of the parasite, secondly a cellular mechanism in the lymphoid-macrophage system centred chiefly in the spleen, and thirdly a specific humoral factor acquired as the result of infection.

MULLIGAN (H W) & SWAMINATH (C. S.) Natural Infection with *Plasmodium inui* in *Silvery sibilus* from South India.—*Jl. Malaria Inst of India*, 1940 Dec. Vol. 3 No 4 pp 603-604 [10 refs.]

In blood films of a young *Silvery sibilus* from the foothills of the Nilgiri Mountains in South India *Plasmodium inui* Halberstadter and Prowazek, 1907 was discovered. Previous records of this parasite are from Borneo Java and Sumatra, this being the first occasion on which it has been found in India. Its discovery is all the more remarkable in that naturally occurring malarial infections of monkeys have been rarely detected in India, the most precise record being that of HOWLES of the presence of *P. semnopithecus* in *Pygathrix (Semnopithecus) entellus* in Assam. Other less satisfactory records are discussed in the paper

C M IV

GINGRICH (Wendell D.) The Role of Phagocytosis in Natural and Acquired Immunity in Avian Malaria.—*Jl. Infect Dis* 1941 Jan-Feb Vol. 68 No 1 pp 37-45 With 6 figs. [23 refs.]

When a canary is inoculated with *Plasmodium cathemerium* the parasites which appear in the blood after an incubation period increase steadily in number up to the height of the infection, when a crisis occurs followed by a rapid disappearance of the parasites. The daily reproduction rate is on an average 15 merozoites, but of these two-thirds fail to survive. This destruction was correlated by CANNON and TALIAFERRO with phagocytosis of infected red blood corpuscles in the spleen and liver. At the crisis there is a greatly increased rate of phagocytosis. The question arises as to whether the failure of two-thirds of the parasites to survive during the acute rise in the infection, an indication of a natural immunity is due primarily to phagocytosis or to some other cause. To investigate this point the author devised a method of blocking the reticulo-endothelial system by daily intravenous injections into the canaries of red blood corpuscles of other birds. The red cells of one type could be safely injected for three days. If continued beyond this *in vivo* agglutination of the injected red cells is liable to occur. If it was necessary to continue blockage another type of red cell had to be injected for the next three days. Blocking the cells in this manner during the incubation period or during the acute rise in the infection did not produce any change in the rate of increase of the parasites whereas blocking carried out during the crisis or immediately after it tended to hinder the crisis and prevent recovery. If carried out during the latent period following the crisis the blockage favoured relapses. It would seem therefore that natural immunity as evidenced by the failure of numbers of parasites to develop during the acute rise in the infection is due to some factor other than phagocytosis. On the other hand the acquired immunity leading to the crisis and recovery is due to active phagocytosis as this can be interfered with by blockage of the phagocytic cells.

C M II

GINGRICH (Wendell D.) Immunization of Birds to *Plasmodium cathemerium*.—*Jl. Infect Dis* 1941 Jan-Feb Vol. 68. No 1 pp. 46-52 With 1 fig [16 refs.]

With the blood of canaries infected with *Plasmodium cathemerium* vaccines were prepared in two ways. In one a 50 per cent. suspension

of red cells from infected blood was exposed to 1 per cent neutral formalin in a closed ampoule for 30 minutes after which the formalin was removed by washing the red cells four or more times. In the other a suspension of unwashed red cells in an ampoule was kept in a water bath at 50°C for ten minutes after which the cells were washed four times. Either of these vaccines injected intravenously in 12 daily doses of 1 cc (40-60 per cent of the red cells injected) produced a high degree of immunity as demonstrated by the low grade infection and early recovery following intravenous inoculation of large numbers of living parasites. This immunity was not however as great as that following natural infections for the inoculated parasites increased slightly in number for two or three days. In birds recovered from infection there was no such increase in the number of parasites injected. With smaller doses of vaccine the immunity was less marked. Vaccines prepared with normal uninfected blood, though not influencing the development of infection following inoculation tended to favour recovery after the crisis. It was considered that this effect was due to an activation of the lymphoid macrophage system leading to a more intensive phagocytosis of the infected cells when the infection had reached its height.

C M IV

MANWELL (Reginald D) COUNTS (Ellen) & COULSTON (Frederick)
Effect of Sulfanilamide and Sulfapyridine on the Avian Malaras.—
Proc. Soc. Experim Biol & Med 1941 Mar Vol. 46 No 3
pp 523-525

Sulphanilamide has been shown by COGGESHALL to be effective against *Plasmodium knowlesi* infection in monkeys but ineffective against *P. vivax* in the same animals. As regards human malaria reports are conflicting but it would appear that the drug and its derivatives are of little value. Coggeshall found that there was no action on the avian parasites *P. lophurae* and *P. cathemerium*. DURAND and VILLAIN showed that the drugs had no effect on *Haemoproteus columbae*. The authors of the paper under review record experiments with these drugs and three avian species—*P. circumflexum*, *P. relictum* var *matutinum* and *P. nucleophilum*. The drugs were given in suspension either intraperitoneally or intravenously. It was found that only one of these parasites was affected. This was *P. circumflexum* which was markedly susceptible to sulphapyridine. This drug was capable of preventing the appearance of parasites in the blood and of causing their rapid disappearance after they had appeared. It was however less active than plasmoquine, atebirin and quinine. It was possible to detect changes in the larger schizonts, which stained abnormally and showed irregularities in nuclear division.

C M IV

BLACKWATER FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION

In the Jalpaiguri Dooars DAS GUPTA (p 652) reports that blackwater fever is prevalent in and after the rainy season. Local natives are almost immune but immigrants are commonly attacked and the disease is particularly fatal in young children.

HUA and CHENG (p. 652) report blackwater fever from Hong Kong and CHEN WONG (p. 653) from Kunning. TOOME (p. 653) reports a case of blackwater and discusses the hypotheses which have been advanced to explain the massive haemolysis and renal insufficiency which occur.

VENKATACHALAM and RATNAGIRISWARAN (p. 653) report encouraging results in the treatment of blackwater fever with an extract of the root bark of *Cassia fistula* a tree which grows abundantly in India and Ceylon.

BICK and DREVERMAN (p. 654) describe a method for the rapid alkalization of urine by means of intravenous injections of sodium lactate and sodium bicarbonate solutions.

BUELL and METTIER (p. 655) discuss paroxysmal nocturnal haemoglobinuria and give details of a case. C IV

DAS GUPTA (C C) Blackwater Fever Observations on Cases treated in the Jalpaiguri Doonars.—*Calcutta Med J* 1941 Jan Vol. 38 No 1 pp 25-38

Jalpaiguri Doonars is one of the intense blackwater fever areas in India. This disease is responsible for a comparatively high mortality amongst the employees of the tea estates and other residents of the area. The present paper is based on the author's experience gained during the last twelve years in the tea-gardens of Jalpaiguri Doonars.

The majority of the cases were seen between August and December. The incidence is at a minimum during January to March, cases begin to appear with the onset of the rains in April. The local population and coolies are almost immune but the disease is prevalent amongst the Bengalee clerks, forest officers, tradesmen and skilled workers such as Chinese carpenters who are immigrants to the blackwater areas. Why the local people and the tea garden coolies are practically free from blackwater fever requires investigation. The author considers the matter without reaching any definite conclusion.

The disease occurs at all ages, but it is particularly fatal in young children. The majority of the cases were in people resident in the Doonars for more than five years.

The author passes to a description of the various hypotheses which have been put forward to explain the causation of the haemolysis in blackwater fever but is unable to throw any light on the problem. The rest of the paper discusses the clinical course of the disease and its treatment. IV York

HUA (T J) & CHENG (S Y) Clinical Report of Two Cases of Blackwater Fever from Chun Wan, New Territories (Hong Kong).—*Cadmus Hong Kong* 1940 May Vol 19 No 2 pp. 96-99

Blackwater fever is extremely rare in Hong Kong, even among the malaria-infested population of the New Territories. The present note gives clinical descriptions of two cases admitted into hospital within a period of less than three weeks. Both patients were immigrants and not natives of the district, both had had repeated attacks of malaria in a district where malignant tertian infection is rampant. There is nothing unusual in the clinical accounts of the cases. IV Y

CHEN WONG (Z C.) Blackwater Fever in Kunming Report of Three Cases.—*Chinese Med J* 1941 Apr Vol. 59 No 4 pp 387-388

Subtertian malaria is prevalent in Yunnan but hitherto no cases of blackwater fever have been reported from this province. In 1938 41 cases of malaria (20 tertian and 21 subtertian) were admitted to the Kun Hua Provincial Hospital. Three of these patients developed blackwater fever and case reports are given they contain nothing out of the ordinary
W Y

TOONE (Elam C.) Jr Clinical Observations on the Renal Insufficiency in Blackwater Fever Report of a Case.—*Amer J Trop Med* 1941 Mar Vol. 21 No 2. pp 217-221 With 1 fig

Details are given of a case of blackwater fever and of clinical and laboratory observations on the extensive renal dysfunction.

The case report contains nothing new. In commenting on it, the author states that the clinical syndrome of massive haemolysis and renal insufficiency has probably the same pathological and physiological background as that seen in transfusion reactions, acute haemolytic anaemias and in intoxications or infections in which there is a sudden and extensive destruction of red cells. The actual pathological and physiological changes occurring in the kidneys have not, as yet, been satisfactorily explained. YORKE and NAUSS (1911) working with rabbits advanced the hypothesis that the renal damage with the resulting oliguria or anuria was caused by the obstruction of renal tubules by haemoglobin casts formed in an acid medium aided by low filtration pressure. These conclusions were later supported by the work of BAKER and DODDS (1925) and DEGOWIN (1938). These observations on experimental animals could not always be confirmed in human subjects and therefore cannot be considered as final. The real contribution of these workers however consisted of their demonstration of the fact that renal insufficiency could be prevented if the urine was kept alkaline. Another explanation for the renal changes was that of LONGCOPE (1913) who regarded the reaction as being anaphylactic in nature. KIMMELSTIEL (1938) observed the presence of an interstitial nephritis in certain infectious diseases, septicæmia, extensive cellular destruction such as burns and with marked haemolysis particularly after blood transfusions. All of Kimmelstiel's cases showed oliguria or anuria of an iso- or hypo-sthenuric type and a rise of the non protein nitrogen of the blood. Kimmelstiel attributed the renal damage to an allergic reaction due to split or altered proteins.

Toone considers that in the light of these studies it is best to assume that no adequate or complete explanation has been offered for the pathological physiology involved in renal insufficiency in blackwater

W Y

VENKATACHALAM (K.) & RATNAGIRISWARAN (A N.) The Use of *Cassia fistula* in the Treatment of Black-Water Fever.—*Indian Med Gaz* 1941 Apr Vol 76 No 4 pp 211-212.

Many years ago O SULLIVAN BEARE claimed that the liquid extract of *Cassia bearana* was of value in the treatment of blackwater fever. As this tree does not grow in India or Ceylon an investigation was

undertaken to discover if any of the indigenous species of *Cassia* could be utilized for the preparation of a therapeutically active extract. It was found that an extract prepared from the root bark of *Cassia fistula* gave encouraging results. This tree grows abundantly all over India and Ceylon up to an altitude of 3 000 feet.

The extract was prepared as follows—One thousand grammes of the powdered root-bark was exhausted with cold 60 per cent. alcohol by the reserved percolate process to the 800 cc. of percolate thus obtained was added 100 cc. of glycerine and the total volume was made up to 1 litre by the addition of 60 per cent. alcohol.

This extract was distributed to various district medical officers for trial in cases diagnosed as blackwater fever. In all 27 cases were treated with the extract with only one fatal result. No untoward effects were noticed in any of the cases. The urine invariably cleared in three to four days after the administration of a total quantity of 12 to 16 fluid drachms, the doses given being generally $\frac{1}{2}$ to 1 fluid drachm every four hours.

In view of these results the authors consider that this extract of *Cassia fistula* should be given a more extensive trial in the treatment of blackwater fever. [As the Editor of the *Indian Medical Gazette* states in a footnote, blackwater fever is a disease which seems to be particularly susceptible to cure by "infallible specifics." This is possibly because of the variability of the intensity of the attacks. He adds, however, that the present report is very much more convincing than the usual run of reports on blackwater fever specifics and that the tabular statement of the cases which he was unable to reproduce because of shortage of space adds conviction to the report. Only one fatal case in a series of 27 is certainly much below the average mortality of the disease. It is unfortunate that there are no controls such as could have been obtained if alternate cases only had been given the extract.]

W J

BUCK (Marjorie) & DREVERMANN (E. B.) A Method for the Rapid Alkalinization of Urine.—*Med J Australia* 1941 Feb. 22 Vol. 1 No. 8. pp 223-225

A rapid-alkalinization of patients who have been given a transfusion of incompatible blood is important in the prevention of renal damage. BURNBY *et al* have already recommended the administration of 120 grains of potassium citrate by mouth. This produces an alkaline urine within 30 minutes. The authors, however, consider that the nausea produced by the salt is a serious objection to this method. Experiments were therefore carried out on normal subjects in order to determine the intravenous dosage of sodium lactate or sodium bicarbonate solution necessary to produce an equally or more rapid alkalinization.

It was found that 10 cc. of a 2 M or 3 M sodium lactate solution caused an increase in the pH of the urine which although maintained, took some time to develop. 10 cc. of saturated sodium bicarbonate solution produced alkalinization within 15 minutes but this was not maintained. 20 cc. of an equal mixture of the two solutions produced in 12 subjects a urine which was alkaline within 15 minutes the change persisting for at least 90 minutes. Only very slight changes were observed in the alkaline reserve of the blood, and no unpleasant symptoms were caused. All the subjects had previously been given 30 gra. of ammonium

chloride by mouth to ensure that the changes in the pH of the urine should be entirely due to the intravenous injection

Sterilization of the solutions containing sodium bicarbonate was effected by filtration of the sodium lactate solution by autoclave or by filtration

John F Loutit

BUELL (Arthur) & METTIER (Stacy R.) Paroxysmal Nocturnal Hemoglobinuria with Hemolytic Anemia (Marchiafava-Micheli Syndrome).—*Jl Lab & Clin Med* 1941 June. Vol. 28 No 9 pp 1434-1439

The syndrome of paroxysmal nocturnal haemoglobinuria was first described by MARCHIAFAVA and NAZARI in 1911. Since then a considerable series of other cases has been recorded by various observers who have described the clinical, pathological and laboratory features which have established nocturnal haemoglobinuria as a specific disease.

In the cases so far reported the disease occurred most frequently during the second and third decades of life and following a protracted course terminated in death. Haemoglobinuria was the predominant sign and occurred almost always at night, frequently accompanied by vague abdominal pains. The course of the illness is characterized by recurrent attacks of fever which are usually intermittent, a predisposition to venous thrombosis and phlebitis and a slight icteric tint in the sclerae and skin. haemosiderin and haemoglobin can be demonstrated in the urine, and in a few cases slight enlargement of the spleen was reported.

The blood changes are most striking. The red cell count is between 1 and 3 millions per cmm. As a rule the cells are slightly larger than normal, so that the anaemia is usually macrocytic, in others however it is normocytic. The haemoglobin is reduced to between 18 and 50 per cent. of the normal. Hyperchromia is noticed in some cases and hypochromia in others. In all the cases recorded the anaemia was refractory to treatment. The resistance to hypotonic saline was within normal range, spherocytes were not observed but there was a persistent reticulocytosis. There was invariably a leucopenia with a relative lymphocytosis and a moderate thrombocytopenia. The sternal bone marrow showed hyperplasia of the erythropoietic elements.

The aetiology of the disease is obscure. In contrast to haemolytic anaemia a familial predisposition apparently does not exist in nocturnal haemoglobinuria. DACIE and others (1938) were able to show that increased carbon dioxide tension was of critical importance for the production of haemolysis.

Details of a case of nocturnal haemoglobinuria which came under the authors' care are given. In discussing the case the authors say that the diagnosis presented a considerable problem. There was anaemia probably of haemolytic origin accompanied by slight icterus and reticulocytosis. Many points were suggestive of pernicious anaemia but the failure of the bone marrow to respond to liver therapy eliminated this possibility. The resistance of the red cells to hypotonic saline within normal range, the negative family history and the absence of an enlarged spleen excluded a diagnosis of haemolytic icterus. Studies of the urine during the patient's first hospitalization were inadequate but during the second period she was in hospital, discovery of the nocturnal emission of haemoglobin led to a diagnosis of nocturnal haemoglobinuria with haemolytic anaemia.

No adequate explanation can be offered for the abnormal haemolytic mechanism in this patient. The observations of Dacie and others were confirmed. After adding the patient's washed red cells to her serum and to normal serum, a slight degree of haemolysis was observed. When the media were acidified with carbon dioxide the haemolysis was greatly increased. Heating the serum to 58 C. destroyed the haemolytic activity. It appears from these studies that the patient's red cells were sensitized to some lysin present in her own serum and in normal serum. The rôle that hydrogen-ion concentration of serum or plasma may play in the production of the lysin deserves further recognition.

II 1

KEILIN (D.) & HARTREE (E. F.) Absorption Spectra of Haemoglobin in Solution and in Red Blood Corpuscles.—*Nature* 1941 July 19 Vol 148 No 3742 pp 75-77 With 1 chart.

This paper is of a technical nature and must be consulted in the original by those interested.

II 1

VENOMS AND ANTIVENENES.

PRELIMINARY ABSTRACTS IN THIS SECTION

VAZ and PEREIRA (p. 657) show that the toxicity of the venom of *Bothrops jararaca* is greatly reduced by heating, and discuss the coagulating and proteolytic actions of this venom and the effect of heat upon them. TABORDA (p. 658) records his experiments on the effect of temperature on the toxic clotting and proteolytic principles of *B. jararaca*. There is a distinct difference in the temperatures at which these principles lose activity. TABORDA and TABORDA (p. 659) have studied the proteolytic enzyme of the venom of *B. jararaca*.

FISHER (p. 659) reports success in the treatment of herpes simplex by means of injections of the venom of *Ascirodon fuscicornis*. PRADHAN and PATWARDHAN (p. 659) have used viper venom in the treatment of haemorrhage into the vitreous of the eye.

ROTTMANN (p. 660) discusses the analgesic effect of the venom of *Naja trijudians* advancing the view that it is due to an inhibiting action upon granulation tissue which, in certain diseases such as tabes dorsalis, invades the nerves or nerve roots. He uses cobra venom in the treatment of apparently cured tabes and other forms of late syphilis. PARKOXET and BERNSTEIN (p. 661) however state that cobra venom acts on the higher nerve centres to produce analgesia and have used it with success in the treatment of angina pectoris.

VITZESCU and STAN STICU (p. 661) note a decrease in the vitamin C content of liver and suprarenal glands of animals killed by cobra venom.

FRAZER and STEWART (p. 661) show that a lethal dose of cobra venom is inactivated when mixed with a finely dispersed suspension of oil in water provided that it is injected intravenously. The protein in blood plasma provides protection against the creaming which occurs if the injection is intraperitoneal, and which is followed by intoxication.

JUNIOR and ARANTES (p 662) show that certain mineral waters in São Pedro possess antitoxic powers against the venoms of a number of snakes.

LINTON and SARKAR (p 662) report a case of cobra bite in which the patient was treated with antivenene and placed in an iron lung which maintained his failing respiration until the antivenene had time to act. The patient recovered, and the case demonstrates the value of the apparatus in providing prolonged artificial respiration.

PERN (p 663) considers the use of potassium permanganate solution to be of definite value in the treatment of snake bite.

From experimental work RAO (p 663) infers that the toxic effect of scorpion sting is due to some acid constituent of the poison and has had success in treatment by means of subcutaneous infiltration with sodium bicarbonate solution round the sting or even in severe cases by intravenous injection of the alkali.

Voss (p 664) describes the symptoms of poisoning by the bite of *Latrodectus mactans* and advocates treatment with antivenene.

C IV

VAZ (Eduardo) & PEREIRA (Anibal) Ação hemocoagulante pelo veneno de *Bothrops jararaca* [Blood Coagulating Activity of the Venom of *B. jararaca*]—*Anais Inst. Pinheiros* São Paulo 1939 July Vol. 2. No 4 pp 3-71 With 20 graphs. English summary [10 refs.]

1 The toxicity of a millesimal solution of dry *Bothrops jararaca* venom in an intravenous injection is reduced about 20 times for the pigeon and more than 25 times (observations showed up to 50 times) for the rabbit, by means of heating the solution for 15 minutes at 65°C.

2 The hemo-coagulating activity of the millesimal venom solution is rapid and can be demonstrated—in vitro by making it act on horse plasma or on a solution of pure fibrinogen or judging by the transformation of fibrinogen into fibrin—in vivo by determinations of the coagulation time before and after injection.

3 The hemo-coagulating activity is reduced about 10 times by heating the solution at 65°C. for 15 minutes.

4 The proteolytic action of the millesimal solution proceeds more slowly than its hemo-coagulating action and it requires very much higher doses. It can be shown—in vitro by keeping the coagulated tubes from 1 to 24 hours at 37°C. for the observation of the liquefaction of the fibrin clot—in vivo by a series of determinations of the time of coagulation before and afterwards at different times in order to disclose the negative phase which means the increase in the coagulation time caused by the alteration of the fibrinogen.

5 The result of the in vitro test depends on two factors—protease of the venom and fibrinogen (or horse plasma) being of little importance whether or not physiologic salt solution has been added in the tubes thus altering the concentration as concerns the proteolysis, addition of physiologic salt solution which lowers the concentration delays the liquefaction.

6 Heating for 15 minutes at 65°C. reduces the proteolytic action on plasma, in vitro about 5 times and about 60 times in vivo judging by the negative phase.

7 Considering the minimum active hemo-coagulating doses in our experiments—0.0001 cc. of the millesimal solution of dry venom

intravenous intramuscular or subcutaneous, in a rabbit—the difference between the coagulating and the anti-coagulating doses (8 cc.) is at least 60 000 times, and between the coagulating and the toxic doses (10 cc.) more than 100 000 times.

[See also this *Bulletin* 1936 Vol. 33 pp 380 381 1937 Vol. 34 pp 650-653 1939 Vol. 36 p 593]

TABORDA (Laura C.) A influencia da temperatura sobre os principios toxico coagulante e proteolitico do veneno da *Bothrops jararaca* [The Influence of Temperature on the Venom of *B. jararaca*]. *Mem. Inst. Butantan* 1940 Vol. 14 pp. 167-180 With 3 graphs. English summary

Our experiments studying the effect of the temperature on the toxic clotting and proteolytic principles of the *Bothrops jararaca* venom led us to the following results

"1 That this effect depends on various other factors besides those already stated by Vital Brazil and Rangel Pestana (quality of the venom, heating period and degree of dilution) that is

(a) the method of dehydration of the venom if in the drying oven at 37°C. or at low temperature and high vacuum

(b) the pH of the water in which it has been dissolved

(c) the method of heating—if applying direct or indirect heat

(d) if the heating of the venom has been carried on in dry state or in solution.

"2. That the venom dehydrated in the drying oven at 37°C. and heated in dry state loses its activity completely only at 180°C.

3 That the dehydrated venom in the drying oven at 37°C. and in 1 per cent. aqueous solution of bi-distilled water at pH 6.2 (as employed in all our experiments) is completely inactivated at 110°C.

"4 That, when in solution, the temperature effect influences the toxic clotting and proteolytic principles from 40°C on, depending on the heating period.

5 That the toxic principle is activated at 50°C. heating being ceased as soon as this temperature is reached at 60°C. it undergoes a decrease and at 70°C. an abrupt drop occurs, no other alteration being observed until the boiling point.

"6 That the clotting principle activity drops suddenly at 60°C. at 70°C. a remarkable activation has been noticed when heated for 5 minutes.

7 That the proteolytic principle is activated at 50°C. (5 and 10 minutes) and at the boiling point (15 and 30') and suffers a sudden drop at 70°C. It is more thermo-resistant.

"8. That a comparison of the effects of the temperature on these three principles shows a noticeable difference at the temperatures at which a sudden drop of their activity is observed, which makes us believe that these three principles are distinct entities. This fact will be better elucidated on determining the exact temperature at which each principle in the whole venom undergoes an abrupt decrease as we shall show in another paper

We believe however that on account of the numerous factors that influence the effect of the heat on the venom, only a separation—our scope—we shall be able to secure exact data and also establish an identity or diversity of these principles.

TABORDA (Armando) & TABORDA (Laura C.) *Protease do veneno da Bothrops jararaca* [Protease of the Venom of *B. jararaca*].—*Mém. Inst Butantan* 1940 Vol 14 pp 181-195 With 9 graphs [13 refs] English summary

All the activity optimums of the proteasis of the *Bothrops jararaca* venom in regard to the enzymatic rules have been determined, using venom dehydrated in the drying oven at 37°C. fresh centrifuged venom and non-centrifuged venom the greatest activity has been noticed in the latter

The following results were obtained

1 The concentration optimum of the enzyme 0.01 per cent. and of the substrate (sodium-caseinate) 1 per cent.

2 the pH optimum 8

3 the temperature optimum 35°C

4 the antiseptic optimum toluol

5 the proteolyse cinetic obeys the rules of Schütz that is the amount of digested casein is proportional to the square root of the time of digestion

6 the autohydrolysis of the caseinate used as a substrate, has been effected under the same conditions

7 a few specific activators and inhibitors of known proteases have been studied inhibition by HgCl KCN and boiling as well as activation by ascorbic acid as mucin have been secured

8 under the same conditions as for the proteasis of the venom the optimum pH and temperature for the hydrolysis of the caseinate by trypsin and the pH by the pancreatin have been determined a great analogy between the hydrolysis by the venom and the trypsin having been observed

9 on account of its optimum of activity activation and inhibitions the proteasis of the *Bothrops jararaca* venom belongs to the tryptasis type

FISHER (A. A.) *Treatment of Herpes Simplex with Moccasin Snake Venom.*—*Arch. Dermat. & Syph* 1941 Mar Vol. 43 No 3 pp 444-446

The author recalls the paper by KELLY on this subject [this *Bulletin* 1939 Vol. 36 p 568] and reports 11 cases in which the venom of the moccasin [*Ancistrodon piscivorus*] in two or three doses each of 0.2 cc. of a 1 in 3 000 dilution were injected subcutaneously one week apart. The lesions of herpes in these patients were in different sites including the mouth, and all patients had been subject to recurring attacks over a number of years. The injections were usually successful in decreasing the number of recurrences or in modifying the severity of the attacks

C W

PRADHAN (K. N.) & PATWARDHAN (N. G.) *Viper Venom in a Case of Recurrent Haemorrhage in the Vitreous.*—*Indian Med Gaz* 1941 Apr Vol. 76 No 4 pp 221-222.

A case is reported in which haemorrhage into the vitreous of one eye, due to syphilis was twice diagnosed with gross impairment of vision. Little improvement took place with antisyphilitic and other treatment until injections of viper venom were given. After a course of 8 injections varying from 0.1 cc. to 1.0 cc. of 1 in 1 000 solution

and spread over a period of 7 weeks, vision had improved to 6/12 and the ophthalmoscopic appearances were much better. The authors discuss the action of the venom, emphasizing its power to promote absorption of granulation tissue, to prevent haemorrhage through coagulative action and to cause absorption of blood clot through cytolytic action. C IV

GRASSET (E.) & SCHAAFMA (A. W.) Antigenic Characteristics of "Boomalang" (*Dispholidus Typus*) Venom and Preparation of a Specific Antivenom by Means of Formalized Venom.—*South African Med J.* 1940. Dec. 28. Vol. 14 No. 24 pp. 484-489

In this paper is reported precisely the same work as was recorded by the authors in *Bull. Soc. Path. Exot.* 1940, Vol. 33 pp. 114-131 and abstracted together with a previous communication on the venom of *D. typus* in the same journal, in this *Bulletin* 1940 Vol. 37 p. 513 C IV

ROTTMANN (A.) Wirkungsweise und Indikationsgebiet von Schlangengiften, insbesondere des Giftes der Brillenschlange [The Action and Therapeutic Use of Snake Venom, particularly of that of *Naja tripudians*].—*Deut. Med. Woch.* 1940. Aug. 16 & 23 Vol. 66. Nos. 33 & 34 pp. 887-890 890-933 With: figs. [31 refs.]

The first part of this paper is a discussion of the pharmacological action of cobra venom, in which no new work is reported. It is pointed out that venom rich in neurotoxin, such as that of *N. tripudians* has effective analgesic properties, but the author considers this to be not a direct action on the nervous system, but rather in view of the fact that it is most effective in diseases characterized by granuloma formation (malignant disease, leprosy, tuberculosis) as an inhibiting action on the granulation masses which have invaded nerve fibres. In tabes dorsalis RICHTER has shown that there is specific granulation formation in the nerve roots and it is thought that this is the origin of the lightning pains and crises so characteristic of that disease. These views form the basis of the treatment employed. The author quotes the results achieved in the treatment of 50 patients in 23 there was complete and lasting relief of pain in 15 the symptoms were greatly relieved, in 9 relief was experienced but the treatment had to be continuous, and 3 cases were refractory.

This treatment is combined with arsenical treatment in patients with positive serological tests, and is particularly effective with polyvalent preparations.

It has been claimed that the simultaneous administration of cobra venom and iodine is dangerous, but the author claims that in proper dosage this is not so and that such a combination has in fact, a considerable value in both treatment and diagnosis of parasymphilitic lesions. The initial doses are —0.5 cc. cobra toxin [strength not stated] subcutaneously and, at the same time 0.3 cc. of a 6 per cent. solution of Iodine intramuscularly. These are increased up to 3 cc. of each, but it is not disclosed at what intervals they are given. (Mirion is hexamethylenetetramme diiodide in gelatin, the proportion of iodine being 15 per cent.) In serologically negative cases this form of treatment may provoke a positive Wassermann reaction and thus reveal the true nature of the disease.

The author therefore advises that cobra venom should be used in the treatment of cured tabes or meningo-vascular syphilis and of mesaortitis and cerebral syphilis even if all tests are negative, and that in the diagnosis of activity in these conditions venom with iodine is valuable.

C IV

PARSONNET (Aaron E.) & BERNSTEIN (Arthur) Cobra Venom. Its Use in Stenocardia Preliminary Report.—*Amer Jl Med. Sci* 1940 Nov Vol 200 No 5 pp 581-586 [14 refs]

Cobra venom acts like morphine on the higher nerve centres to produce analgesia but it does not form a habit or produce mental depression on the contrary it appears to have a stimulating action on mental efficiency and it widens the fields of vision. It is slow to act but has a cumulative effect. Though it depresses the respiratory centre there have been no reports of dangerous reaction even with doses five times as large as that considered as the safe starting dose. There is no evidence of danger to liver or kidneys.

The authors have treated five cases of angina pectoris when drugs other than morphine had failed to give relief. Satisfactory results were obtained in all though the action of the venom was slow to begin. The dosage was 5 mouse units intramuscularly as the initial dose repeated on the following two or three days after that the dose was given every other day and finally only once or twice weekly. The dosage may be increased if necessary to 10-15 mouse units. Details of the cases are given.

Cobra venom cannot relieve the pain of acute coronary thrombosis but in angina pectoris these preliminary trials indicate that it is a valuable therapeutic agent.

C IV

NITZESCU (I I) & STAN SUCIU (Martha) Das Kobragift und das Vitamin C. [Cobra Venom and Vitamin C.]—*Klin Woch* 1940 Oct. 26 Vol 19 No 43 p 1112.

The authors injected 6 guineapigs, each with a lethal dose (0.4 mgm. dry venom per kilo) of cobra venom. The vitamin C content of 100 gm. of liver and suprarenal glands was estimated immediately after death and as controls 6 guineapigs of similar weight were killed. The average results were—Controls, liver 25.7 mgm. suprarenal 117.2. envenomed animals liver 10.9 suprarenal 51.4.

These results are similar to those which have been observed in animals injected with diphtheria toxin and in cases of acute infective disease.

C IV

FRAZER (A. C.) & STEWART (H. C.) Inactivation of Cobra Venom by Finely Dispersed Emulsion.—*Brit Jl Experim Path* 1940 Dec. Vol 21 No 6. pp 361-366 With 2 figs.

The authors show that a lethal dose of cobra venom mixed with a finely dispersed suspension of oil in water is rendered innocuous provided that it is injected into animals by the intravenous route. If injected intraperitoneally it kills after a delay. Intraperitoneally the mixture creams and the rate of creaming coincides with the rate of development of symptoms of intoxication. Soap stabilized emulsion will cream in saline solutions or acids but if protein is added protection can be demonstrated.

The cobra venom is probably inactivated by adsorption at the oil water interface and if this mixture is injected intravenously the plasma provides protection to the emulsion this protection is not present on intraperitoneal injection. The details of the experiments and the preparation of the emulsions are given. C IV

JUNIOR (Favorino Prado) & ARANTES (J B) Poder anagotico das aguas do São Pedro sobre alguns venenos ofídicos. [The Antitoxic Power of S. Pedro Waters against Snake Venoms.]—*Mém. Inst Butantan* 1940 Vol. 14 pp 157-165 [16 refs.] English summary

"1 The alkaline-sulphurous water of the fountain Juventude, in São Pedro seems to show a distinct anagotoxic power in regard to the venom of the rattlesnake (*Crotalus terrificus*) of *Bothrops jararaca* and of *Micrurus corallinus*.

"2. The pigeon injected with a mixture prepared *in vitro* with 1 cc. of venom diluted in saline and 1 cc. of water of the fountain Juventude resisted 2 DML of the venom of *Crotalus terrificus* and 1.5 DML of the venom of *Bothrops jararaca*.

3. The pigeons injected with 4 DML of crotalic venom, 2 DML of bothropic venom and 1 cc. of the water of the fountain Juventude survived longer than the test animals.

"4. This effect seems to be due to a oxido-reduction phenomenon of the venom caused by the sulphidinated compounds of the water

5. The water of the fountain Juventude after standing for 10 days and consequently losing its colour and characteristic odor has not protected a pigeon injected with 2 DML of crotalic venom. After standing the water loses its anagotoxic power

"6 The chloric-bicarbonated-sodatic water of the fountain Almeida Salles seems to present weak anagotoxic power in regard to the examined ophidic venoms.

"7 The chloric-sulphurated-sodatic water of the Glacinda fountain is destitute of anagotoxic power against the examined venoms.

"8. The mineral waters under examination were used within 48 hours after having been collected at the fountain "

LINTON (R.) & SARKAR (Nasimuddin) A Case of Snake Bite Successfully Treated with the Help of the "Iron Lung. —*Indian Med Gaz.* 1941 Feb. Vol. 76, No. 2, pp. 92-93.

The patient, a boy of about 12 years, was admitted to hospital with a history suggesting snake bite and with symptoms of poisoning by a snake of the colubrine group. In spite of antivenene his condition deteriorated, but although respiration had almost ceased and the pulse was imperceptible at the wrist, he was placed in the "iron lung". The respiration rate was adjusted to 18 per minute and very soon a quantity of fine froth was blown out from the mouth cyanosis disappeared and the pulse became full and strong. In the meantime more antivenene was given to a total of 110 cc. In 1½ hours the patient was able to answer questions and in 5 hours he was removed from the apparatus. In the next 24 hours he had some fever but rapidly recovered afterwards.

The "iron lung" is a means of giving prolonged artificial respiration during which antivenene has a chance to act. It is therefore evidently

a most valuable adjunct to treatment but the chief problem in snake bite that of getting the patient to the hospital alive still remains

C IV

PERN (Sydney) *Potassium Permanganate for Snake Bite* [Correspondence].—*Brit Med J* 1941 Mar 1 pp 338-339

The author does not agree with the commonly accepted modern view that potassium permanganate is useless as a treatment for snake bite. He quotes his experience of about a dozen cases in man and 5 in dogs and has used as strong a solution of permanganate as can be made in cold water of which he injects several syringe loads under and around the punctures. He has never seen harmful effects from this treatment, but has observed rapid improvement where the symptoms were bad. There were no fatalities in his cases. [There is no information as to the types of snakes responsible but the author writes from Ballarat Victoria.] He makes a plea for the full scientific investigation of the method remarking that potassium permanganate is regarded favourably by those who like him live among snakes.

C IV

FELDBERG (W) *The Action of Bee Venom Cobra Venom and Lysocleithin on the Adrenal Medulla.*—*Jl. Physiology* 1940 Dec. 20 Vol. 89 No 1 pp 104-118. With 9 figs. [11 refs.]

RAO (P Krishna) *Treatment of Scorpion Sting.*—*Jl Indian Med Assoc* 1941 Jan Vol. 10 No 4 pp 154-155

Scorpion poison is acid in reaction and it is possible to render it neutral to litmus by the addition of alkali in proper proportion.

Experiments in rabbits showed that the poison when neutralized with sodium bicarbonate solution and injected subcutaneously produced no evidence of intense pain such as was seen in rabbits similarly injected with poison not neutralized. Neutralized poison injected intravenously did not kill but poison not neutralized did so in smaller doses. If the unneutralized poison were injected either subcutaneously or intravenously and if sodium bicarbonate solution were injected into the same area or into a vein within 30 seconds the rabbits did not show signs of intense pain nor was the poison fatal though in controls these effects were seen.

The author therefore infers that the toxic effect of scorpion sting is due to some material acid in reaction which may be rendered innocuous by the addition of alkali. For treatment he recommends that 1-2 cc. of 2 per cent. sodium bicarbonate solution be infiltrated subcutaneously around the sting. This may be repeated if necessary and the injections may be given at any time after the sting if the symptoms are present. In very severe cases intravenous injection of 10 cc. of a 5 per cent. solution may be given. He has treated 84 cases by these procedures and all recovered. He points out that in heating sodium bicarbonate may be changed to the carbonate but that this does not affect its action [but there may be some danger in the use of large doses of sodium bicarbonate solution sterilized by heat for intravenous work see this *Bulletin* 1940 Vol. 37 p 877]

C IV

Voss (A. H.) The Bite of the Black Widow Spider.—*Clinical Med*
1941 May Vol. 48. No. 5 pp. 123-125 With 1 fig.

Latrodectus mactans has been reported from Europe, Australia, North and South America and Africa. The symptoms of poisoning from the bite of this spider commence from 15 minutes to several hours after the bite. There is severe pain at the site and the patient may adopt the characteristic attitude, bent forward and moving the legs with difficulty. Pain spreads to the lower abdomen, which gradually presents board like rigidity sometimes mistaken for acute abdominal disease, and to the chest. Dyspnoea may be marked and perspiration is profuse. In spite of the potency of the venom the case mortality is probably about 5 per cent only. In most cases recovery takes place in a few days, though numbness, tingling and general weakness may persist for some weeks.

The author reports 6 cases. In four treatment with morphine, calcium, magnesium sulphate (intravenously) or other drugs was not very satisfactory, but in two treated with specific serum the results were dramatic. He therefore recommends antivenene as the ideal treatment. (See also this *Bulletin* 1935 Vol. 32, pp. 673, 614, 615, 1936 Vol. 33, p. 401, 1937 Vol. 34, pp. 723-731, 1939 Vol. 36, pp. 570, 571, 868, 1940 Vol. 37, pp. 516, 517.] C II

MISCELLANEOUS.

JAMES (Clifford) Clinical Medicine in the Solomon Islands.—*Med Press & Circular* 1941 Mar 19 Vol. 205 No. 12, pp. 231, 234.

The island of Choiseul is 100 miles long by 20 wide and round the coast lies a swamp fed by the 200 inches of rain falling in the year and breeding *Anopheles*. In the early days native villages were built in the hills, for defence, but since the advent of white men fighting has ceased, the natives have been attracted to the coast for fishing and trade and the population has been gradually depleted by malaria. With quinine treatment this depopulation has now been checked. The author notes that malarial nephrosis, due to the quartan parasite, is cured by quinine injections, that blackwater fever occurs, and that gallstones are common in association with enlarged spleens. The commonest disease is phagedaenic ulcer and the author notes that "Burton's line," drawn diagonally down through the Pacific, divides not only the non-malarial East from the malarial West, but also the non-phagedaenic East from the phagedaenic West, which suggests a causative relationship between the two conditions.

Tropical myositis occurs, appendicitis is not seen. Gonorrhoea is common and is the usual cause of sterility. Yaws is very prevalent.

For Europeans the author advises 5 grams of quinine daily as a minimum dose, to be increased if necessary, but never to be omitted. For the prevention of prickly heat he recommends the cutting down of fluids at midday in order that sweating should be diminished, and the use of a powder of boric acid 1 part, zinc oxide 2, and amylin 3 parts, or of a salicylic acid lotion. C II

CARMAN (John A.) Mathari Mental Hospital, Kenya—*Nursing Times* 1941 Feb 15 Vol. 37 No 1868 pp 146-149
With 10 figs

The Mathari hospital was originally built in 1906 and, like many old lunatic asylums resembled a prison rather than a hospital. In 1932 improvements were started and to-day the hospital is one of the most tastefully laid-out and one of the best equipped in the country. It has been realized that many of the patients must live permanently in the hospital and it has therefore been made as attractive as possible. Its growth and development will always be associated with the name of Dr H. L. GORDON the visiting physician.

There are 235 beds for Africans 14 for Asiatics and 15 for Europeans and the staff is fully trained and adequate. The patients are restrained but little the maximum possible liberty being allowed to them as much of their time as possible is occupied in domestic routine duties. Those who cannot be allowed much liberty spend their time in large open compounds under the supervision of experienced attendants. The results of treatment are excellent, under these conditions especially in those in whom the mental upset has a toxic origin in some disease like malaria, dysentery or influenza. A committee of responsible persons under the chairmanship of the District Commissioner meets monthly to inspect the hospital patients especially women are not discharged until this committee is satisfied that they will be properly cared for until able to take up normal life once more.

C IV

KNOTT (F. A.) & LEIBEL (B.) Prevention of Pyrexial Reactions in Intravenous Therapy—*Lancet* 1941 Mar 29 pp 409-411

Minor pyrexial reactions often occur as unexpected complications of intravenous therapy. These reactions tend to take the form of small outbreaks and the solutions used are often sent back for sterility tests but investigation has shown that failures in sterilization are very rare. The reactions are usually due to protein bodies in the solutions and these may be dead bacteria, free bacterial proteins or traces of other proteins. Dead bacteria or their proteins may be found in sealed screw-capped bottles it is therefore wise to filter solutions through Seitz discs and then through sterilized sintered glass filters (to remove fibres from the discs) before storage. But this process will not remove free bacterial proteins it is therefore essential to use water distilled and delivered in a closed system to sterilized bottles which are immediately autoclaved and capped to prevent the entry of bacteria. Organisms may enter with the chemicals used but these may be eliminated by the Seitz filtration.

Detection of dead bacteria in sediments after centrifugation is a matter of simple microscopy but for the estimation of protein the albuminoid ammonia figure should be calculated pyrogenic reactions have been given by solutions of which this figure was from 0.005 to 0.025 part per 100 000.

Foreign protein other than bacterial may enter solutions from apparatus which has been cleaned and boiled in sterilizers used for dishes and instruments the quantity of protein may be very small, but may be enough to produce pyrogenic reactions if large intravenous doses are given from these pieces of apparatus. Similarly protein may

be found in cracks on the inside of rubber tubing, and may enter solutions passing through the tube. In wards little should be done except a thorough flushing with clean cold water or weak soda solution sterilization should be a laboratory procedure.

A further source of trouble may be the still itself and if there is high albuminoid ammonia in water from the still, double distillation from glass should be carried out.

Suspended particles of non protein matter have not, in the authors experience, caused much trouble, but cotton and other fibres may be found, they are best avoided.

[For the serious effects of pyrogenic substances in the treatment of cholera, see this Bulletin 1939 (vol 36 p 380) C IV]

EARLE (K Vigors) Experiences with Sulphonamide Derivatives in Some Tropical Conditions.—*Brit Med J*. 1941 Mar 29 PP 478-478 [16 refs]

Dengue is not as a rule favourably influenced by the sulphonamide drugs and the author points out the danger of reducing the leucocytes in a disease in which leucopenia is a feature. Good results may be expected in the early stages of lymphogranuloma inguinale, and some improvement may result even in the later stages. In ulcerative granuloma combined treatment with sulphapyridine and intramuscular foudin has been satisfactory. Sulphonamide is useful in tropical ulcer only, in the very early stages (no mention is made of the local application of the drug).

In fungous diseases of the skin in which secondary infection with streptococci has taken place the author has found it advisable first to clear up the streptococcal infection by means of sulphapyridine taken by the mouth. Secondary infections of tropical or salt water ear a fungous disease of the meatus may be prevented by sulphonomides taken by the mouth as may secondary infections of the lesions of yaws. Sulphapyridine is useful in both non-filarial and filarial lymphangitis in the latter it is again probably active against the secondary bacterial invaders. Cellulitis of suppuration due to the stings of venomous marine animals, and infected lesions caused by various arthropods respond to therapy with these drugs. The author has treated cases of beriberi with vitamin B₁ combined with sulphonamides by the mouth with successful results. C IV

EARLE (K Vigors) Bush-Tea Haematuria.—*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol 34 No 5 PP. 395-398.

Bush-tea is a home-made infusion of *Guanaria officinale* (legum vitae) prepared usually from the leaves, but sometimes from the bark or the wood, and used almost as a panacea in the West Indies, but in particular for rheumatic conditions and gonococcal infection. The wood contains α and β guaiaconic acids (70 per cent or thereabouts) gallic acid (11 per cent) and gallic acid (in small amount) the constituents of the leaves are not stated, but a case is reported in which haematuria followed 24 hours after a draught of bush-tea made from the leaves. The symptoms may result from repeated small doses, very small in the highly susceptible. There may be complaint of lumbar pain chills, even rigor with malaise and passage of dark coloured, even black urine or the last may occur without the

others. The urine contains red corpuscles, and granular and epithelial casts. The author suggests that where these effects are seen after small doses of the tea they may be like the Italian favismo anaphylactic in nature. Alkaline and emulcent drinks are followed by cure in a couple of days there is no report of a case ending fatally. Which of the constituents singly or in combination is responsible for the haematuria has not been determined.

H H S

BAYLEY (H H) Treatment of Larva Migrans.—*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol. 34 No 5 pp 399-400

In Barbados larva migrans is often found in children and adults who have handled the sand above high water mark. The larva travels about 2.5 cm in 24 hours leaving a typical burrow visible to the naked eye. Itching is intense. The method advised has been successful in curing the condition in a few days in all the patients so treated by the author.

The skin is thoroughly dried and cleaned with alcohol. Cedar wood oil is used to clear the affected area which is then examined with the $\frac{3}{4}$ inch objective of a dissecting microscope. A good hand lens can also be used with advantage.

The ends of the burrow must be carefully examined as it is here that the larva may usually be found. It stands out clearly as a white spherical mass due to the presence of plasma which surrounds it. Having noted the position of the larva the skin is cleaned for operation and 2 minims of procaine 1:1000 is used to desensitize an area half an inch in diameter with the larva in the centre. A cautery is then applied until a small burn is produced. Sulphanilamide grains 7½ is prescribed for two days; this helps the burrow to heal, as it has obviously been contaminated by bacteria and much of the itching is caused by this secondary infection. When the patient returns in three days' time a faint brown line and a small cautery burn are all that remain and no further treatment is necessary.

"Each burrow must be examined and wherever a larva is discovered the cautery has to be applied.

C W

RAHMAN (S A.) & ZAIDI (M. A.) Study on the Normal Polynuclear (Arnoth) Count at Hyderabad-Deccan.—*Indian J Med Res* 1941 Jan Vol. 29 No 1 pp 225-230 With 2 graphs.

One hundred and twenty healthy male subjects ranging from 15 to 45 years of age were examined. The average weighted mean of the polynuclear count was 2.432, with a standard deviation of 0.234. This average is less than the British standards of Cooke & Ponder (2.74) and Kennedy (2.628). The authors suggest that the deviation to the left as compared with the British standards is due to climatic factors, and in this they agree with Kennedy and Mackay who found an average weighted mean for British airmen in Iraq of 1.935. The total leucocyte count did not differ appreciably from the results obtained in colder climates but the lymphocyte and eosinophil counts were higher. [In figure 2 the polygons ascribed to Cooke & Ponder and to Kennedy respectively should be transposed.]

IV P Kennedy

be found in cracks on the inside of rubber tubing, and may enter solutions passing through the tube. In wards little should be done except a thorough flushing with clean cold water or weak soda solution. Sterilization should be a laboratory procedure.

A further source of trouble may be the still itself and if there is high albuminoid ammonia in water from the still double distillation from glass should be carried out.

Suspended particles of non-protein matter have not, in the authors experience caused much trouble, but cotton and other fibres may be found they are best avoided.

[For the venous effects of pyrogenic substances in the treatment of cholera, see this *Bulletin* 1939 Vol. 36 p. 380, C IV]

EARLE (K. Vigors) Experiences with Sulphanilamide Derivatives in Some Tropical Conditions.—*Brit Med J* 1941. Mar 29 pp 476-478. [16 refs.]

Dengue is not as a rule favourably influenced by the sulphonamide drugs and the author points out the danger of reducing the leucocytes in a disease in which leucopenia is a feature. Good results may be expected in the early stages of lymphogranuloma inguinale and some improvement may result even in the later stages. In ulcerative granuloma combined treatment with sulphapyridine and intramuscular foudrin has been satisfactory. Sulphanilamide is useful in tropical ulcer only in the very early stages [no mention is made of the local application of the drug].

In fungous diseases of the skin in which secondary infection with streptococci has taken place the author has found it advisable first to clear up the streptococcal infection by means of sulphapyridine taken by the mouth. Secondary infections of tropical or "salt-water" ear a fungous disease of the meatus may be prevented by sulphonamides taken by the mouth, as may secondary infections of the lesions of yaws. Sulphapyridine is useful in both non-filarial and filarial lymphangitis in the latter it is again probably active against the secondary bacterial invaders. Cellulitis of suppuration due to the stings of venomous marine animals and infected lesions caused by various arthropods respond to therapy with these drugs. The author has treated cases of beriberi with vitamin B₁ combined with sulphonamides by the mouth, with successful results. C IV

EARLE (K. Vigors) Bush-Tea Haematuria.—*Trans Roy Soc. Trop Med & Hyg* 1941 Mar 27 Vol. 34 No. 5. pp. 395-399.

"Bush-tea" is a home-made infusion of *Guaiacum officinale* (lignum vitae) prepared usually from the leaves, but sometimes from the bark or the wood, and used almost as a panacea in the West Indies, but in particular for rheumatic conditions and gonococcal infection. The wood contains α and β guaiconic acids (70 per cent. or thereabouts) gualacetic acid (11 per cent.) and guaiconic acid (in small amount) the constituents of the leaves are not stated, but a case is reported in which haematuria followed 24 hours after a draught of bush-tea made from the leaves. The symptoms may result from repeated small doses, very small in the highly susceptible. There may be complaint of lumbar pain chills, even rigor with malaise and passage of dark coloured, even black urine or the last may occur without the

others. The urine contains red corpuscles and granular and epithelial casts. The author suggests that where these effects are seen after small doses of the tea they may be like the Italian favismo anaphylactic in nature. Alkaline and emulcent drinks are followed by cure in a couple of days there is no report of a case ending fatally. Which of the constituents, singly or in combination is responsible for the haematuria has not been determined.

H H S

BAYLEY (H H) Treatment of Larva Migrans—*Trans Roy Soc Trop Med & Hyg* 1941 Mar 27 Vol 34 No 5 pp 399-400

In Barbados larva migrans is often found in children and adults who have handled the sand above high water mark. The larva travels about 2.5 cm in 24 hours, leaving a typical burrow visible to the naked eye. Itching is intense. The method advised has been successful in curing the condition in a few days in all the patients so treated by the author.

The skin is thoroughly dried and cleaned with alcohol. Cedar wood oil is used to clear the affected area which is then examined with the $\frac{3}{8}$ inch objective of a dissecting microscope. A good hand lens can also be used with advantage.

The ends of the burrow must be carefully examined as it is here that the larva may usually be found. It stands out clearly as a white, spherical mass due to the presence of plasma which surrounds it. Having noted the position of the larva the skin is cleaned for operation and 2 minims of procaine 1:1000 is used to desensitize an area half an inch in diameter with the larva in the centre. A cautery is then applied until a small burn is produced. Sulphanilamide grains 7½ is prescribed for two days; this helps the burrow to heal, as it has obviously been contaminated by bacteria and much of the itching is caused by this secondary infection. When the patient returns in three days time a faint brown line and a small cautery burn are all that remain and no further treatment is necessary.

Each burrow must be examined and wherever a larva is discovered the cautery has to be applied.

C W

RAHMAN (S A.) & ZAIDI (M A.) Study on the Normal Polynuclear (Arneith) Count at Hyderabad-Deccan—*Indian J Med Res* 1941 Jan Vol. 29 No 1 pp 225-230 With 2 graphs.

One hundred and twenty healthy male subjects ranging from 15 to 45 years of age were examined. The average weighted mean of the polynuclear count was 2.432, with a standard deviation of 0.234. This average is less than the British standards of Cooke & Ponder (2.74) and Kennedy (2.628). The authors suggest that the deviation to the left as compared with the British standards is due to climatic factors, and in this they agree with Kennedy and Mackay who found an average weighted mean for British airmen in Iraq of 1.935. The total leucocyte count did not differ appreciably from the results obtained in colder climates but the lymphocyte and eosinophil counts were higher. [In figure 2 the polygons ascribed to Cooke & Ponder and to Kennedy respectively should be transposed.]

W P Kennedy

fitness, and about whose diet and habits detailed information was available. Subjects from the following eight groups were examined—European, Chinese Malay, Javanese Batak, Punjabi (Sikh), Punjabi (Hindu) and Tamil.

All subjects were conveyed to the laboratory by car after a night's rest and without food. Precautions were taken to prevent their indulging in any form of exercise on getting up and on arrival at the laboratory they lay on camp beds and rested during the preliminary period. Strict supervision was made to ensure complete rest and quiet. Two basal metabolism measurements were made upon each subject on four separate days. The temperature, pulse rate and blood pressure were also measured with the subject in the basal and post-absorptive state. Of the two daily metabolism measurements one was made between the first half hour and the first hour and the other during the second hour. A third measurement was made if either was unsatisfactory. The basal metabolic rate (B.M.R.) was determined with a Benedict Recording Spirometer and a half face mask was used in preference to mouthpiece and noseclip as it was more comfortable. Control experiments were performed, using the Douglas-Haldane technique and the results showed agreement between the two methods.

The mean values of the basal metabolism of the groups examined showed a depression below the standard found in a temperate zone for normal individuals of the same age and surface area in every case. The results can also be divided into two categories according to the degree of depression of the B.M.R. in the different racial groups. In the European, Javanese Batak and Sikh groups the depression was approximately five per cent. or more below the normal DuBois standard, whilst in the Chinese Malay, Punjabi and Tamil groups the depression was approximately ten per cent. or more below the normal DuBois standard. A statistical examination of these results showed that a significant difference existed between the mean values of any two groups belonging to the separate categories—with the exception of the Punjabi group. (The basis for this assumption is that a significant difference exists when the difference between any two groups exceeds twice its standard error.)

No significant difference was shown to exist between the average pulse rates of different racial groups. The Sikhs exhibited the most rapid pulse rate under basal conditions, and the Europeans the slowest in spite of their basal metabolism being somewhat higher than most other groups.

The systolic pressure showed remarkably little variation in the groups examined, with the exception of the Sikhs. Allowance for the greater weight and surface area of this group reduced this difference to a certain degree. The same may be said of diastolic values and pulse rates which are closely comparable. It is quite clear that, where basal values are concerned, physically fit Europeans belonging to the age group investigated do not exhibit higher systolic and diastolic values than physically fit Asiatics. The average values in the European group examined were in fact slightly lower. Further investigations of this nature on some of the older age groups may be of interest in determining to what extent this relationship is maintained in normal individuals belonging to these races in later life.

In a comprehensive appendix, full experimental results are given in tabular form.

C. G. Warner

ROBINSON (S) DILL (D B) WILSON (J W) & NIELSEN (M.)
Adaptations of White Men and Negroes to Prolonged Work In
Humid Heat.—*Amer J Trop Med* 1941 Mar Vol 21 No 2
pp 261-287 With 2 figs. [19 refs]

It is generally believed among cotton growers that in a hot environment the Negro has greater resistance to heat and greater capacity for work than the white man. The subjects in this study included 15 white men of whom 8 were members of the laboratory staff ages 26 to 48 and 7 were sharecroppers in Mississippi of ages 18 to 21. There were 33 negro male subjects between 17 and 24 years of age of whom 11 were northern university students, 20 were Mississippi sharecroppers and 2 were Mississippi house servants. The negro students and the laboratory staff members were heavier than the sharecroppers. The negro sharecroppers averaged 282 cm.² of body surface per kilogram of body weight as compared with averages of 277, 270 and 260 for the white sharecroppers, negro students and the laboratory staff respectively. Thus in dissipation of heat the sharecroppers had the advantage of somewhat greater surface exposure than the others.

Observations were made at Boston during spring and later in Mississippi after two weeks or more of exposure to the warm humid weather of summer. In each experiment the fasting subject, clad in trunks, socks and tennis shoes, walked two hours (if able to do so) on a motor driven treadmill at 5.6 km. per hour up a grade of 8.6 per cent. This work raises the metabolism to about 7 times the basal level and so demands an effective mechanism for heat dissipation in humid heat. All subjects were capable of walking for the full two hours in the cool northern laboratories, but several of the laboratory staff and both negro servants were forced to stop before the end of the two hours in the Mississippi experiments. All the sharecroppers walked for two hours easily. The environmental conditions under which the experiments were conducted were as follows. At Boston the experiments were made under ordinary laboratory conditions with dry bulb temperatures ranging from 15 to 25 C. and an average humidity of about 45 per cent. In Mississippi the dry bulb temperature ranged from 28 to 33°C. with an average of 30.5° and an average humidity of about 80 per cent. Under such conditions the subject's skin was wet with sweat within a few minutes after work started. Soon the trunks and socks were saturated and sweat began to drip on to the treadmill.

Observations were made of the heart rate throughout work and recovery by means of a cardiometer of the blood pressure during the first 5 minutes of recovery and of the rectal temperature before starting and at 15 to 20 minute intervals during work. In some of the experiments once in the first hour and again in the second hour of work surface temperatures at 11 points on the skin were measured by means of a thermocouple. Metabolism and lung ventilation measurements were made during various periods of the walk together with determinations of weight loss and water intake. Blood sugar and lactic acid were estimated by standard methods and acetone was assessed by Rothera's qualitative test on samples of urine collected at 20-minute intervals during the first hour of recovery.

In addition to the indoor experiments described above 5 of the laboratory staff and 5 of the negro sharecroppers went through a 2 hour walk at about 6.7 km. per hour on an outdoor level course.

the boats, other in more advanced stages, attended to the nets. Plans improved, and brooding thoughts of suicide madness and degeneration gave way to hopefulness and a greater willingness to persevere with treatment. Later larger schemes were undertaken and carried out, such as developing the colony's refrigerating plant, and the supply of electric light and power to the islanders in place of the old kerosene lamps, and provision of radios for the relaxation and amusement. Work meant more than the filling of the hours and the earning of money, although it was good, too, to earn money—for a leper. What they learned gave them a trade something to do in the world of the well, should they be paroled. The author gives the romantic story of the discovery of the curative drug, Chaulmoogra, and describes the scientific development of Calson, the provision of more hospitals on modern lines and of laboratories and opportunities for research.

A few words on the life story in the background. The discovery of his disease necessitates Langford breaking off his engagement to Jane, his fiancée, meanwhile correspondence with Carita, Volsoo, a girl of the family with whom he had stayed in the Philippines, and to whom he wrote "to improve his knowledge of Spanish," had ceased when she found that her family was infected. Later he met her again and proposed marriage to her, but she refused him and returned she became "negative" went away to look after paroled and returned uninfected leper. Carita has a brother Vicente who tries to stir up strife and trouble in the island but dies in a typhoon. There is an amusing interlude which will appeal to those readers who have lived in the tropics for something analogous to the experience of most of the tropics. Two persons agreed to share the progeny of a sow. There were 9 piglets. The owner claimed the odd one by "right of maternity" the other by Napoleonic Law which gives her right to the father. Finally, on the advice of the magistrate who used it all in a feast dividing it in two they cut it in halves and used it all in a feast. celebration of the results of their litigation. All through his stay in Calson, Langford has a firm friend, Tom, who is companion and devoted servant. He marries and Langford is left. After 25 years in Calson during which time his disease slowly but steadily progresses he obtains permission to return to America for admission to the Federal Leprosarium at Carville. At his journey's end he dies in the train from a heart attack.

We started at the outset of this review that *Who Walk Alone* is exceptional in more ways than one. Other exceptional points are the provision of an index, and a very complete index, and an appendix of questions commonly asked by non-medical persons about leprosy. These questions are very appropriately chosen and very adequately answered. The book gained the vote of the members of the American Bookseller Association as their "Discovery of the Year" and we would like to endorse that opinion and wish it all success. H. H. S.

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TROPICAL DISEASES BULLETIN

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[No 12.

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS

Prices of Abstracts in this Section

General—In the Annual Report of the League of Nations Eastern Bureau (p 679) there is mention of the *Proteus OXK* form in Sumatra and in India, and of the epidemic of the *Proteus OX19* form in Shanghai.

SINGER (p 679) reports experiments in which limited multiplication of the Rickettsiae of typhus Rocky Mountain fever and Q fever appeared to occur in cell free media.

REYNES (p 680) states that sera of patients suffering from fevers of the typhus group may become temporarily or persistently positive to several of the recognized tests for syphilis.

GOYAL (p 680) has found Rickettsiae non pathogenic for man in the brains of rats in Calcutta.

Louse- and flea-borne—LIU *et al* (p 681) show that although in normal mice epidemic European typhus exists as an inapparent infection only a fatal infection may be induced by irradiating the animals and administering heavy infecting doses by the abdominal route.

DYER (p 681) discusses the prevention of murine and of epidemic typhus.

MELENBY (p 681) discusses the recent extension of endemic typhus in the United States, which has been especially evident in cities and towns but has also occurred in rural areas. SILVA and OCHOA (p 682) have isolated a murine strain from rats in Zacualco Mexico a similar strain had previously been isolated from a human patient. It is claimed that in the high plateaux the murine form is spread from man to man by lice. [A similar claim has been made in Shanghai by RAYNAL.]

BENGTSON (p 682) discusses the complement fixation test in endemic typhus.

Tick-borne—BRIGHAM and WATT (p 682) have recovered a highly virulent strain of Rocky Mountain fever virus from *Dermacentor variabilis* in Georgia. In general, the strains found in eastern U.S.A. are less virulent than those in the west. HASSIN (p 683) gives a description of the histo-pathological appearances in a case of Rocky Mountain fever in which there was non-suppurative meningo-encephalitis. LUDLAM *et al* (p 683) record a case of probable tick borne typhus, which occurred at a Scottish port. It is thought that the patient was infected by a tick brought in cargo from S America.

Mite-borne—VAN DER SCHROEFF (p. 684) describes an outbreak of mite fever and tropical typhus, in N Sumatra, among labourers engaged in clearing jungle. He contends that the diseases are identical, the absence of primary ulcer in tropical typhus being due possibly to transmission by ticks which, in the act of biting, penetrate the tissues more deeply than mites. LIDDEMA (p. 685) reports a case of the *Protrus OXX* type of fever from Java, where the disease is but rarely seen. MAY (p. 685) records the *Protrus OXX* form from Papua. KAWAHIGASHI (p. 685) reports on mite-borne typhus in Formosa. KOUTWEMAAR and ESSEVELD (p. 686) note that Sumatran mite fever produces immunity in guineapigs for at least 13 months, but that convalescent serum has no protective or curative effect.

Vaccination—DURAND and GIROUD (p. 686) describe the preparation of vaccine against epidemic typhus by the use of the lungs of rabbits infected by the tracheal route. Rabbits are not easy to infect in this way but by the use of a suitable technique a heavy infection can be produced, which provides a vaccine of good immunizing power.

FINLAYSON and GROBLER (p. 687) show that three doses of vaccine give better protection than one to guineapigs, but state that alum-treated vaccines protect 80 per cent. of animals even when only one dose is given. RUIZ-CASTANEDA (p. 687) shows that vaccine of a murine strain will protect guineapigs against infection with epidemic typhus.

PARKER (p. 688) shows that vaccine prepared from infected ticks gives good protection against Rocky Mountain fever for one year. In areas of high virulence it protects against death but not much against infection. In areas of low virulence it is effective against infection.

Q fever—BURDET and FREEMAN (p. 688) confirm previous findings that the American and Australian strains of *Q* fever virus are immunologically identical but that the former is the more virulent. The virus mixed with immune serum, or treated with lauryl sulphate gives immunity but no fever on injection into guineapigs. Killed or formalin-treated *Rickettsiae* produce immunity. They (p. 689) describe the cultivation of the American strain of *Q* fever virus on chicken embryos. Virulence is increased after such culture and is comparable with that which occurs in the tick with the virus of Rocky Mountain fever. In both cases it is thought that the fact that no antibodies are formed may be the explanation of this increased virulence.

DAVIS (p. 689) shows that *Rickettsia diaporica* may persist in the tissues of *Ornithodoros laricata* for as long as 1,001 days. The ticks do not apparently transmit the organisms by bite or to their progeny but the excreta are infective. SMITH (p. 690) quotes evidence which shows that in Australia *Rhipicephalus sanguineus* must be regarded as a potential vector of *Q* fever.

BENGTSON (p. 690) discusses active and passive immunity in relation to *Q* fever in experimental animals.

She (p. 690) refers to work on the complement fixation reaction in *Q* fever which is specific for that infection.

HOSKINSBROOK *et al.* (p. 691) describe an outbreak of *Q* fever in employees of the National Institute of Health Washington. The source of infection was not discovered, but the organism was under investigation in the building at the time and it is probable that the outbreak was due to inhalation of infected dust. All the patients showed X ray evidence of patchy central pneumonia. HEADORFFER and DUFFALO

(p 691) report a case of Q fever with patchy pneumonitis in Montana. The Weil Felix test was negative but *R. diaporica* was agglutinated. *Sandfly fever etc.*—WALKER and DODS (p 692) give an account of sandfly fever in Palestine where there was an epidemic in 1940. The disease usually lasts more than three days and secondary rise of fever occurs in some cases. There is apparently no lasting immunity. A sensation of constriction round the thorax and a crop of vesicles on the palate were constantly present. PEARSON (p 693) shows that sandfly fever may be one of the causes of benign lymphocytic meningitis. TOPPING *et al* (p 694) report on cases of Colorado tick fever probably due to a virus transmitted by *Dermacentor andersoni*. In comment MEGAW notes the similarity between this disease and dengue and suggests the name tick dengue. *Bartonellosis*—PATIÑO-CAMARGO (p 695) reports a case of Guaitara fever (bartonellosis) in Bogotá. GEIMAN (p 695) gives details of the preparation of three media for the cultivation of *Bartonella bacilliformis* growth with any of these is luxuriant enough to permit immunological and other investigations.

DARRIBA (A Rodríguez) *Rickettsiosis humanas* [Human Rickettsial Diseases.]—*Revista Clínica Española* Madrid. 1941 Feb 1 Vol 2 No 2 pp 113-128 C IV

This is a general résumé of present knowledge of fevers of the typhus group. No new work is reported. A table of deaths due to epidemic typhus in Spain from 1911 to 1930 is given.

LEAGUE OF NATIONS HEALTH ORGANISATION EASTERN BUREAU SINGAPORE ANNUAL REPORT FOR 1940 pp 64-68. With 3 graphs—(J) Typhus in Countries (K) Typhus in Sea and Air Ports. C IV

In Northern Sumatra about 500 cases of typhus have been reported each year for the last 10 years of an average of 490 cases annually during the last 5 years. 425 were of the *Proteus* XK type. The distinction between scrub typhus and tsutsugamushi that an ulcer is present in the latter but not in the former is not now held to be valid. In India there is evidence of seasonal variation of the XK type, which is most common in August and September towards the end of the monsoon. This seasonal incidence is probably connected with the biology of the vectors.

Typhus is prevalent in Shanghai dating from the influx of refugees in 1937. RAYNAL concludes that there is a form intermediate between classical louse-borne and murine typhus and that the latter may be transmitted by the louse. The epidemics reach their peak between March and July when climatic conditions are moderate C IV

SINGER (E) *Experiments on the Survival of Rickettsiae in Cell-free Media.*—*Australian Jl Experim Biol & Med Sci* 1941 June. Vol 19 Pt 2. pp 123-124

Two sets of experiments are briefly described in which limited multiplication of Rickettsiae appears to have occurred in cell free media. The first set was carried out some years ago when the Rickettsiae of epidemic typhus and Rocky Mountain spotted fever were cultivated (1937)

up to from 3 to 5 passages in a medium consisting of equal parts of guineapig serum Tyrode's solution and 1 per cent. glutathione (G.S.H.) solution. The Rickettsiae were first adapted to tissue culture conditions by cultivation on the tunica vaginalis of a guineapig in serum-Tyrode mixtures.

The second set of experiments was done recently on the *R. burneti* of Q fever. Preliminary cultivations were carried out with weekly passages in a medium consisting of serum-Tyrode mixtures to which guineapig spleen was added.

Success was obtained only in one in ten of the first transfers through this medium but from the third transfer onwards "takes" were secured in about 3 of every 5 cultures up to the 18th transfer.

Material from transfers later than the third was used in attempts to grow the Rickettsiae on various cell-free media. Evidence of multiplication of the virus was obtained only with the following —

(a) Up to the second transfer with serum-Tyrode mixtures incubated for a week with guineapig spleen.

(b) Up to the third transfer with a serum-Tyrode mixture separated by a semi-permeable cellophane membrane (treated by Seymour's method—*Jl Biol. Chem.*, 1940 Vol. 134 p 701) from a serum-Tyrode mixture incubated for one week with guineapig spleen.

(c) Also up to the third transfer with a serum-Tyrode mixture separated by a similar membrane from fresh Tyrode extract of spleen.

John W D Meyer

REVYIES (V) Les réactions de diagnostic de la syphilis au cours des fièvres typho-exanthématiques. (Serum Reactions of Syphilis in Fevers of the Typhus Group.)—*Bull Soc. Path Exot* 1940. Vol. 34 Nos 1-3 pp 51-57

At the Pasteur Institute of Saigon, sera from seven cases of tropical typhus which reacted to *Proteus* OAK were repeatedly examined by several of the recognized serum tests for syphilis.

The usual result was that reactions which were negative in the early stage of the disease soon became temporarily or persistently positive. In one case the reaction was positive at the outset, but became negative during the short period when the reaction to OVA was at its highest afterwards it became more strongly positive than it had been at the beginning of the illness.

The sera of seven cases of endemic typhus (reacting to *Proteus* OY19) were examined in the same way five of these remained negative throughout and two became positive for a few days.

The only test that gave consistent results was the Kahn reaction the Calmette-Nassol, Hecht Mutermilch and Meinicke tests appear from the tables to have given such irregular responses as to be of doubtful significance.

J W D M

GOYAL (R. K.) The Presence of an Enteric of Rickettsial Infection in Wild Rats of Calcutta.—*Indian Med Gaz* 1941 Feb Vol. 76. No. 2 pp 84-88

From January 1937 to December 1938 100 rats were caught in various districts in Calcutta these were killed by drowning and the brains were extracted and incubated bacteria-free brains were emulsified and injected into male guineapigs. Seventy-two per cent.

gave a positive reaction a mild fever lasting three or four days with some thickening of the tunica vaginalis smears taken from the tunica, spleen and brain showed the presence of both extra and intra cellular pleomorphic Rickettsial bodies. There was no positive Weil-Felix reaction in any of the guineapigs, and rabbits inoculated with the virus showed no agglutinins for any of the strains of *Proteus* λ . An emulsion of the brain and tunica of an infected guineapig was inoculated into two volunteers, there was no reaction of any kind. The author concludes that the rat strain of virus was non-pathogenic for man. Three hundred other rats were killed and examined during the period September 1939 to July 1940 but none was found to be infected.

D Harvey

LIU (P Y) SNYDER (John C) & ENDERS (John F) **Fatal Infection of Irradiated White Mice with European Typhus by the Intra-Abdominal Route.**—*Jl Experim Med* 1941 May 1 Vol. 73 No 5 pp 669-680 With 1 plate

In normal mice European typhus exists as an inapparent infection in which the virus disappears after three passages and Rickettsiae cannot be demonstrated. Experiments were carried out and are described in this paper which show that if mice are irradiated and then given considerable doses of the virus of epidemic typhus by the abdominal route, 100 per cent. of the animals become infected and die and very numerous Rickettsiae are found in the peritoneal exudate and in the spleen and other organs of the body by this means mice can be utilized as experimental animals in place of guineapigs and without the risk of laboratory infection which arises when the nasal route of infection is employed. Normal mice failed to show any signs of infection when inoculated with material collected from the irradiated animals. This method might be employed for general experimental work with this virus and also for the preparation of vaccines

D H

DYER (R. E) **The Charles Franklin Craig Lecture for 1940 The Control of Typhus Fever**—*Amer Jl Trop Med* 1941 Mar Vol. 21 No 2 pp 163-183 With 1 map & 1 chart. [44 refs.]

This lecture was delivered at the 36th Annual Meeting of the American Society of Tropical Medicine at Louisville Kentucky on November 12th 1940. The paper is divided into two parts one dealing with the control of endemic typhus as it occurs in the United States, and the other dealing with the control of epidemic typhus as it has occurred in Europe and Asia and may occur again under war conditions. As regards endemic typhus the problem is one dealing with rat eradication or at least reduction of numbers, and also rat protection of houses and stores. Immunization has no place in dealing with endemic typhus. On the other hand epidemic louse-borne typhus must be dealt with by thorough and effective delousing of the stricken population and in addition active immunization by means of killed Rickettsial vaccines.

D H

MELENEY (Henry E.) **Recent Extension of Endemic Typhus Fever in the Southern United States.**—*Amer Jl Public Health* 1941 Mar Vol. 31 No 3 pp 219-227 With 5 maps. [20 refs.]

A paper read before the Epidemiological Section of the American Public Health Association

under observation on the ninth day when the rash was seen to be reddish-brown macular slightly papular and associated with petechiae. The trunk and limbs were affected, but the palms and soles showed no rash. The fever lasted about 21 days. The serum reactions were—positive to *Proteus OX2* up to a titre of 1-480 but negative to *OX19* and *OXK* throughout. Positive to *Bact. paratyphosum B (H)* up to the same titre but negative to *Bact. paratyphosum B (O)* to *Bact. paratyphosum A (H)* and to *Bact. typhosum (O and H)*. Reactions to *Br. abortus* and to a strain of *leptospira* were negative. There were strongly positive Wassermann and Sachs-Georgi reactions, these became almost completely negative after three months without anti-syphilitic treatment.

Guinea-pig inoculations were negative, both for the blood of the patient and for the brains of six rats from the ship.

Valid reasons are given for regarding the reactions as being compatible with the diagnosis of a typhus-like fever belonging to the tick borne group. A fever of this kind is known to occur in São Paulo in South America and the other clinical features of the case favoured the diagnosis. The authors conclude by suggesting that "The patient was possibly infected by one or more ticks which had travelled from South America, either among a cargo of hides or infesting one of the rats on the ship he had been unloading."

J W D M

VAN DER SCHROEFF (J P) Een epidemie van mijtekoorts en tropical typhus in Atjeh en Onderhoorigheden. (An Epidemic of Mite Fever and Tropical Typhus in Atjeh and Dependencies.)—*Geneesk. Tijdschr. v. Nederl. Indië* 1941 May 20 Vol. 81 No. 20 pp. 1103-1122. With 5 charts. English summary.

Atjeh is situated at the extreme northern extremity of Sumatra and the epidemic in question comprised 29 cases of mite fever and 48 of tropical typhus. The epidemic broke out among the coolie labourers engaged in clearing jungle growth for the planting of oil palm. In this area there had originally been a coffee plantation which had to be freed not only from coffee bushes but from great overgrowth ofalang grass. Mice, rats and the halang bird, with their parasites—mites (larvae of *Trombicula deliensis*) and ticks (*Amblyomma*)—were abundant. The coolies received wounds on the legs in the course of clearing operations. Work was begun in June 1899 with 28 coolies and the first four cases of tropical typhus made their appearance in July. By September an average of 178 coolies were at work and in October the number had risen to 216. In the latter month there were 3 cases of mite fever and 14 of tropical typhus, while in November although the coolie strength had fallen to 39 there were 16 cases of each disease. Prophylactic measures were taken—these consisted in smearing the bare legs with a mixture coconut oil 18 litres cajuput oil 800 cc. By February 1940 when there were as many as 201 coolies at work, there were only 4 cases of tropical typhus and 1 case of mite fever.

It may be noted that clinical symptoms of tropical scrub typhus and mite fever are much the same. The latter disease shows a "primary effect" and the former none. The difference is explained by most workers as due to the fact that the mite pierces the skin only superficially and that, with the deposition of the virus, necrosis and reaction occur. The tick, on the other hand, has a long proboscis which reaches down to the subcutaneous tissue and no necrosis is produced. In both

affections there was swelling of regional lymph nodes and sometimes a rash was observed. The serum reaction for both is an agglutination of the *Kingsbury* strain of *Proteus* but not of *X19* (shop typhus reaction)

In this article the author contends that both infections are the same and that both may have a primary effect, whether of mite or tick bite although this is not always evident. A case mortality rate of 3 to 4 per cent. may be expected. Sulphonamides in this epidemic did not influence the clinical course of the disease W F Harvey

LEIMENA (J.) Een geval van scrubtyphus (Tropical Typhus) [A Case of Scrub Typhus].—*Geneesk Tijdschr v Nederl Indië* 1941 Feb 18 Vol. 81 No 7 pp 339-341

Scrub typhus is found in the Dutch East Indies particularly in Sumatra but shop typhus is more prevalent in Java. Since 1931 patients with shop typhus giving the Weil-Felix reaction with *Proteus* *X19* have regularly been seen at the Immanuel hospital the author now describes the second case of scrub typhus seen there in a man from Bandoeng who had never been out of Java. No rash was seen nor was there any evidence of primary sore the Widal reaction was negative but the Weil-Felix with *Proteus* *OXX* was positive to 1 in 400. The fact that there was no primary sore leads the author to the opinion that this case resembled scrub typhus rather than the Sumatran mite fever [but LEWTHWAITE & SAVOOR (this *Bulletin* 1940 Vol. 37 p 847) have come to the conclusion that this matter of primary sore is not valid in differentiation between these diseases which are all identical with tsutsugamushi] C W

MAY (A J.) Endemic Typhus in Papua.—*Med Jl Australia* 1941 Apr 12 28th Year Vol. 1 No 15 pp 449-450

The author describes two cases of fever in Europeans in Papua. One patient had been working on newly cleared scrub land his rise of temperature lasted for two weeks ending by lysis there was a rash of rose coloured patches on the 6th day but no eschar could be found. His serum on the 12th day agglutinated *Proteus* *XK* at a titre of 1 in 160 but failed to agglutinate *Proteus* *X19* or *X2*. In the second case serum tests were not performed but the course of the disease was similar to that in the first patient. Histories of similar fevers are not uncommon in Papua and the author considers it probable that the disease has long existed there in the natives though this is the first occasion on which it has been proved. C W

KAWAHIGASI (K.) Erfahrungen an der Tutugamusi-Krankheit besonders ihrer sog atypischen Fällen [Atypical Tsutsugamushi Fever].—*Taiwan Igakkai Zasshi (Jl Med Assoc. Formosa)* 1941 Feb Vol. 40 No 2 [In Japanese pp 355-367 [13 refs.] German summary p 367]

In the last 3 years 10 cases of tsutsugamushi fever have been observed and in 5 of these no primary sore could be discovered. It is therefore considered that atypical tsutsugamushi fever is common in Formosa. The only difference noted between the typical and atypical fevers is the presence of the primary sore in the former D H

the endemic (murine) and epidemic viruses, but he concludes that such differences are not enough to justify disregard of vaccines prepared from endemic strains as practical immunizing agents against classical typhus virus.

J W D M

PARKER (R. R.). Rocky Mountain Spotted Fever Results of Fifteen Years Prophylactic Vaccination.—*Amer J Trop Med.* 1941 May Vol. 21 No. 3. pp. 369-383 With 2 charts

In this article Parker deals with the protective value of killed vaccine made from the tissues of infected ticks (*Dermacentor andersoni*)

In the western Montana area, where the case-fatality rate is very high, 85 attacks occurred during 15 years of 51 non-vaccinated cases 42 were fatal (82.35 per cent.) of 37 cases in which the attack occurred in the same year as the last vaccination only 3 died (8.11 per cent.) and the average severity of the attacks was greatly reduced. The remaining 7 cases were left out of account because protection is claimed only for the year in which vaccination is carried out and they had been vaccinated from 1 to 5 years before the attack.

The vaccine therefore, gives a high degree of protection against death but little protection against attack in areas of highly virulent infection

In South Idaho, where the case fatality is low (about 5 per cent.) there were 22 cases in a control group of 364 non-vaccinated persons during the period of observation in 1926-27 and only one case among 183 vaccinated persons.

In areas of infection of low virulence vaccination gives almost complete protection against attack.

Apart from these test areas 455 000 persons were vaccinated and only 29 of these were attacked within a year of being vaccinated there were no deaths.

It was also found that persons vaccinated in two or more successive years were much better protected than those who were only once vaccinated. A dose of the vaccine given within a day or two after the bite by an infected tick modified the severity of the attack in areas where mild infections predominated and the incubation period was usually prolonged.

The only condition in which vaccination is not recommended is when a bite by a suspected tick has already occurred in areas of highly virulent infection.

J W D M

BURNEY (F. M.) & FREEMAN (Mavis). Studies of the X Strain (Dyer) of *Rickettsia beretti*. II. Guinea Pig Infections, with Special References to Immunological Phenomena.—*Jl. Immunology* 1941 Apr Vol. 40 No. 4. pp. 421-436. With 4 figs.

This research was carried out in Australia with a strain of virus, sent from America, which had been isolated from a patient infected in the laboratory in Montana. It was confirmed by the authors that this X virus is considerably more virulent for guinea-pigs than the local strain of virus. Fatal infection frequently resulted and fibrinous exudate was noted in the spleen. Numerous *Rickettsiae* were found in this exudate and in the tissues. It was also confirmed that the X strain (American) and the local strain of virus from cases of Q fever are immunologically identical. In guinea-pigs large doses of X virus

produced fever in 24 hours and this fever continued till death. With medium doses a primary rise was noted followed later by a period of fever lasting 6 to 18 days.

When the virus was previously mixed with immune serum and then injected no fever resulted but when tested later the animals were found to be immune. Similar results were obtained when the virus was treated with lauryl sulphate solutions.

Rickettsiae killed or inactivated by formalin or by heat produce a substantial immunity in guineapigs. D H

BURNET (F. M.) & FREEMAN (Mavis) *Studies of the X Strain (Dyer) of Rickettsia burneti*. I. Chorioallantoic Membrane Infections.—*Jl. Immunology* 1941 Apr Vol. 40 No. 4 pp. 405-419. With 3 figs. [19 refs.]

Employing the X strain (American) of Q fever virus the authors carried out a series of experiments on the inoculation of egg membranes by the modified Goodpasture technique. Younger embryos 7 to 9 day old were readily infected. In the older 12-day embryos there was some evidence of resistance and patches or foci of infection could be seen and counted. The histological changes in these areas were similar to those produced in egg culture by other virus diseases. These changes were limited to the superficial layer of cells and showed oedematous and vacuolated cells containing *Rickettsiae*. None of the immune sera at hand showed any definite activity in preventing the formation of specific foci in the egg membrane or reducing the number of those on the older embryos. It was noted that the virulence of the infection for guineapigs was much increased after culture in the egg membrane and this increase of virulence is compared with that noted in the tick with the virus of Rocky Mountain fever. The explanation given for this increased virulence is that in both instances no antibody is formed, whereas in infected animals antibody is produced.

D H

DAVIS (Gordon E.) *Rickettsia diaporica*. Its Persistence in the Tissues of *Ornithodoros turicata*.—*Public Health Rep* 1940 Oct 11 Vol. 55 No. 41 pp. 1862-1864

Thirty-eight *O. turicata* were fed on a guineapig ill with the original Montana strain of American Q fever. They were subsequently tested at irregular intervals for transmission of *R. diaporica* and for the presence of this organism in their tissues. In the first test they were allowed to engorge on and detach voluntarily from guineapigs and in no case was the disease transmitted during this process. In the second test the ticks were ground up and injected. By this test it was shown that *R. diaporica* may persist in the ticks for 1001 days after the infective feed. Tests to determine if the ticks could transmit the infection to their progeny were all negative. It was shown that the excreta of the ticks were infective on injection into guineapigs. The authors recall that *O. turicata* may sustain *Bact. tularensis* in its tissues for 674 days does not transmit that organism while feeding or to its progeny and that, as also with *R. diaporica*, the virulence is not affected by long residence in the tick or by prolonged fasting of the tick. C IV

SMITH (D. J. W.). Studies in the Epidemiology of Q Fever. 8. The Transmission of Q Fever by the Tick *Rhipicephalus sanguineus*.—*Australian Jl Experim. Biol & Med Sci* 1941 June. Vol. 19 Pt. 2 pp. 133-136.

Experiments carried out at Brisbane and described in this important paper demonstrate that *Rhipicephalus sanguineus* must be regarded as a potential vector of Q fever. Hundreds of ticks and about 60 guinea pigs were used. Larval, nymphal and adult ticks were infected with Q fever by feeding them on infected guinea pigs.

The virus was shown to persist in nymphs which had been infected in the larval stage and in adults infected as nymphs, but infection was not transmitted from infected adults to their progeny.

Infected nymphs transmitted infection to 63 per cent. of the guinea pigs on which they fed. In the case of adults the infection rate was 92 per cent.

Rickettsiae were seen in 29 out of 40 smears made from adult ticks which had previously been exposed to infection in the larval or nymphal stage and in 11 of 23 cases in which serial sections were made of adult ticks belonging to the same batch. Faeces collected from infected adult ticks were found to be highly infective to guinea pigs. 65 days after collection the infecting dose was one-hundred-thirtieth of a gramme.

J. W. D. M.

SMITH (D. J. W.). Studies in the Epidemiology of Q Fever. 7. The Biology of *Haeurophysalis humerosa* Warburton and Nuttall (Acarina, Ixodidae) in Queensland.—*Australian Jl Experim. Biol & Med Sci* 1941 Mar. Vol. 19 Pt. 1 pp. 3-5. With 1 fig.

BENGTSON (Ida A.). Studies on Active and Passive Immunity in "Q" Fever Infected and Immunized Guinea Pigs.—*Public Health Rep* 1941 Feb. 21 Vol. 56. No. 8 pp. 327-345. With 9 figs.

Rickettsial active and passive immunity in experimental animals as shown by the Q fever virus follows in general the same laws as those which apply in bacterial active and passive immunity. Active immunity results when the disease has run its course in the animal or when killed organisms are introduced into the body. Evidence of immunity is found in resistance to reinfection with the disease and in the development of agglutinating and neutralizing antibodies. Sera from animals which have recovered from the disease or which have received killed cultures confer passive immunity when mixtures of the immune serum and the infecting agent are inoculated into animals. Active immunity can be readily produced in experimental animals by the use of killed Rickettsial vaccines. Hyperimmune sera may be produced in guinea pigs and in rabbits by the inoculation of killed cultures followed by the injection of living organisms. The titre of agglutination in the rabbit sera, however, in no instance rose above 1 in 640.

D. H.

BENGTSON (Ida A.). Complement Fixation in "Q" Fever.—*Proc. Soc. Experim Biol & Med.* 1941 Apr. Vol. 46. No. 4 pp. 665-668 [11 refs.]

In this paper a complement fixation reaction for Q fever which is specific among the Rickettsial diseases, is described. Yolk sac antigen was found to be superior to mouse spleen antigen in tests when human

sera were used. The test was shown to have a good degree of sensitivity it appeared in 9 to 13 days after the onset of the disease and persisted for at least 305 days. The indications are that the test is of value for diagnosis and that it affords evidence of immunity. *D H*

HORNIBROOK (J W) NELSON (K R.) DYER (R. E.) TOPPING (N H) BENGTSON (I A) *An Institutional Outbreak of Pneumonitis. I Epidemiological and Clinical Studies* [HORNIBROOK & NELSON]—*Public Health Rep* 1940 Oct. 25 Vol 55 No 43 pp 1936-1944 With 1 fig & plates 1-4 II. *Isolation and Identification of Causative Agent* [DYER TOPPING & BENGTSON]—*Ibid* pp 1945-1954 With 5 figs (3 on plates 5-6)

This report describes in detail a remarkable outbreak of infection by the Rickettsiae of Q fever. Between the end of March and the middle of May 1940 15 cases of fever with one death occurred among 153 employees in one building of the National Institute of Health at Washington where strains of Australian and American Rickettsiae of Q fever had been under investigation since 1938.

The fever lasted from 5 to 15 days except for one slight case in which the duration was only 2 days.

The most remarkable feature of the disease was that although there were practically no physical signs all the patients showed X ray evidence of a patchy central pneumonia.

Blood counts and cultures gave negative results so did agglutination tests against *Bact typhosum* *Bact paratyphosum A* and *B* *Brucella abortus* *Proteus OX19* and *Bact tularensis*.

The causative agent was identified by Dyer Topping, and Bengtson as the filter passing Rickettsia of Q fever [also known as *R burneti* and *R diaporica*].

This organism was isolated from three out of four patients in whose cases attempts were made to find the virus. It proved to be identical in all respects with the strains which were under investigation in the building but a curious feature of the outbreak was that no cases occurred in the wing in which the Rickettsiae were being studied.

The source of infection was not discovered. The inhalation of infected dust raised by sweeping the floors seemed to be the only hypothesis which was supported by the evidence.

Reference is made to eight recent reports of outbreaks of a similar type of disease variously designated as acute pneumonitis atypical pneumonia atypical broncho-pneumonia 'virus pneumonia, etc. All but one of these reports have been from the U.S.A. The authors state that it is a matter of conjecture whether these were caused by Rickettsiae.

[The high degree of susceptibility of mice and other animals to severe pneumonia resulting from the introduction of the Rickettsiae of the various fevers of the typhus group seems to favour the tentative suggestion by the authors that this outbreak may have been caused by dust borne infection.] *J W D M*

HESDORFFER (M B) & DUFFALO (J A) *American Q Fever Report of a Probable Case.*—*Jl Amer Med Assoc.* 1941 Apr 26 Vol. 116 No 17 pp 1901-1902. With 2 figs. [16 refs.]

The patient contracted a fever while working in the woods in Montana although there were no signs of pulmonary disease, an

The author concludes— It would therefore appear that benign lymphocytic meningitis is made up of a group of diseases, and that the virus of sand-fly fever is capable of causing the condition.

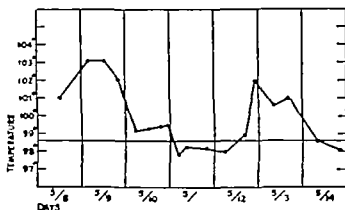
[As this form of meningitis sometimes occurs in a number of other diseases, such as mumps, measles and anterior poliomyelitis, it might preferably be regarded as an occasional feature of these infections rather than as a group of diseases.] J W D M

TOPPING (Norman H.) CULLYFORD (James S.) & DAVIS (Gordon E.)
Colorado Tick Fever—*Public Health Rep* 1940 Nov 29
Vol 55 No 48 pp. 2224-2237 With 5 figs.

This interesting report deals chiefly with 11 cases of Colorado tick fever which occurred in May and June 1940 and were closely investigated by members of the U.S.A. Public Health Service.

All the cases showed a close clinical resemblance to dengue in every detail except that there was no rash.

The fever always came in two spells of 1 to 3 days duration separated by a fever free interval of $1\frac{1}{2}$ to 3 days the total duration of the fever was never more than 7 days.



Typical temperature record in a case of Colorado tick fever
[Reproduced from *Public Health Reports*]

There was pronounced leucopenia ranging from 1,300 to 4,500 leucocytes per cmm. Blood cultures, animal inoculations and agglutination tests were negative in all the cases.

The epidemiology was quite different from that of dengue there was no evidence of person to person infectivity and the vector was a tick *Dermacentor andersoni*.

All the patients had been recently bitten by a tick, usually 4 or 5 days before the onset. All the cases occurred during the period of activity of the vector tick.

Information was collected from physicians who had reported 53 cases in the locality during 1940 most of these were similar to the 11 cases described by the authors but some of them had only one spell of fever and in some the duration was more than 7 days. The authors state that it is obvious that some of the cases were not Colorado tick

fever as we know it they also point out that the popular name of the disease is misleading because it undoubtedly occurs in some of the surrounding States.

[The evidence strongly favours the view that the disease is caused by a virus closely related to that of dengue and transmitted by a tick presumably from an animal of the wilds. The disease may be provisionally classified as a non-epidemic fever belonging to the dengue group and the name tick dengue would be descriptive of its chief features.] J W D M

PATINO-CAMARGO (Luis) El primer caso de bartonellosis (fiebre verrucosa del Guátara o Verruga) en Bogotá. [The First Case of Guátara Fever in Bogotá.]—Reprinted from *Rev Facul de Med Bogotá* 1940 Dec. Vol. 9 No 6 11 pp With 5 figs & 1 chart [13 refs] English summary

A cavalry corporal 24 years of age was admitted to hospital with symptoms which were at first diagnosed as due to typhoid fever [the symptoms as detailed—a little anaemia, meteorism palpable spleen rapid heart action—seem hardly to warrant such a diagnosis without further confirmation and blood examination] He died 40 days later Seventeen days before his death blood was taken as bartonellosis was then suspected, and growth was obtained in Noguchi's medium in 10 days and the organism confirmed by inoculation of monkeys a *Macacus rhesus* and a *Cebus satuellus*

[It is probably true that this is the first case of this condition observed in Bogotá but as is acknowledged in the text, the patient had a few months before been in Nariño where Guátara fever is common.

During the year 1939 1448 patients died from verruga in the Department of Nariño among a population of about 150 000 (See also this *Bulletin* 1940 Vol. 37 pp 271 582, 583)] H H S

GERMAN (Quentin M) New Media for the Growth of *Bartonella bacilliformis*—*Proc Soc Experim Biol & Med* 1941 June Vol. 47 No 2 pp 329-332. [Summary appears also in *Bulletin of Hygiene*]

Media liquid semi-solid and solid tissues and developing chick embryos have all been used for growing *Bartonella bacilliformis* Noguchi's semi-solid medium for leptospira and nutrient blood agar have proved the most serviceable but even on these growth has been slow and relatively sparse. The observation had been made that in leptospira medium there was need of serum and haemoglobin from laked corpuscles indicating the need for certain vitamins and growth-promoting factors found in the cellular elements of the blood. Also in disease the organism multiplies within the reticulo-endothelial cells suggesting the possible advantageous use of ingredients in monocyte media. The author has used for his experiments five strains from Peru, from cases of Oroya fever verruga peruana and the proboscis of a sandfly *Phlebotomus verrucarum* and finds the following media quite satisfactory

1 *Liquid tryptone serum* prepared as follows —

The liquid tryptone-serum medium is mixed as follows 75 cc. of a sterile 1% solution of tryptone in distilled water adjusted to pH 7.6-7.8 25 cc. of fresh rabbit serum, and 0.2 cc. of a sterile (Berkefeld N) mixture

MURK (p. 706) reports high incidence of lepromatous ulcers in Trinidad, and outlines a treatment with gentian violet silver nitrate and tannic acid, which has given good results. SLOAN (p. 706) has had success in the treatment of perforating ulcers with urea.

Reviewing the reports of various conferences SEX (p. 706) emphasizes that control can only be obtained by isolation of patients from young people, but that it may be aided by treatment and education. DAVEY (p. 706) reports on the progress of a series of untreated cases during two years at a village in Nigeria where isolation was enforced by the villagers themselves, the patients living in a small leper village. There was evidence of improvement in the position.

ROGERS (p. 707) discusses the voluntary sterilization of married male lepers. C IV

MANALANG (J) Influence of Climatic Changes on "Interruptions and "Relapses in Leprosy.—*Philippine Med Assoc.* 1941 Mar Vol. 21 No. 3 pp 121-128. With 1 fig

The author has studied the seasonal incidence of leprosy in the Philippines, in relation to climatic conditions, on very similar lines to the work of LOWE and CHATTERJI in Calcutta [see this *Bulletin* 1939 Vol. 36 p. 1015]. He classes the changes in his cases as interruptions when lepra bacilli reappear in the tissues and relapse when clinical signs also recur. Interruptions were slightly more numerous in the cool period, as were "relapses" to a still less degree but he thinks the seasonal differences too slight to be other than accidental in nature for the temperature variations ranged over only 5° centigrade against 13° in Calcutta. L. Rogers

LEPROSY IN INDIA. 1941 Apr Vol 13 No 2 pp 48-49—A Note on Leprosy in the Kangra District of the Punjab.

This note was prepared from information supplied by Dr. MALHOTRA, District Leprosy Officer Kangra District. The district has more leprosy than the rest of the Punjab and the known incidence is 0.1 per cent. of the population. The incidence is highest at 4 000 to 6 000 feet above sea level, and it is noted that the proportion of lepromatous cases is 54 per cent. of the whole at levels above 2,000 feet. This is the first area in India in which the number of lepromatous cases equals that of neural cases as a rule the proportion is one to three or more. Of the known cases, 8 per cent. were 15 years of age or less 58 per cent. were over 35. This is a rather surprising distribution in an area in which there are so many lepromatous cases. Tuberculous disease is rarely seen.

The epidemiology of the disease, therefore shows considerable differences in Kangra from that in most parts of India. C IV

CHANDY (P. J.) Leprosy in the Fyzabad District.—*Leprosy in India.* 1941 Jan. Vol. 13. No. 1 pp. 18-22.

This report, based on 1 000 cases seen in two and a half years at a hospital in India, is mainly of local interest. A classification according to caste revealed a considerably higher rate among the high caste Brahmans than among the lowest castes. Two-thirds of the cases were neural and one-third lepromatous. L. R.

MOTTA (Joaquim) & COSTA (Henrique de Moura) A situação da lepra no Distrito Federal. [Leprosy in the Federal District, Rio de Janeiro]—*Folha Med* 1941 May 25 Vol 22. No 10 pp 112-115

This study was carried out in three and a half months November 1940 to February 1941. First from inquiries the authors collected information in 1,206 cases of leprosy of whom 561 were living at home or in hospital (46.5 per cent) 58 (4.8) had been transferred from other States 187 (15.5) had died and 397 (32.9) could not now be traced. [These total 1,203 only and the percentages, as given by the authors, are wrongly calculated.] They then made a study to determine the actual prevalence at the time and reach a total of 1 507 of whom 871 (57.7 per cent.) lived at home and 636 (42.3) were in institutions 522 at Curupaiti and 114 in a leper hospital. Of the total 1 428 (94.7) were adults and 79 (5.2) were children and of the adults 801 (56.0) were men and 627 (43.9) were women. One thousand and forty three were white, 185 coloured 127 black while of 152 the race was not known. As regards occupation those in domestic service were most numerous 244 next, but far below were artisans (73) and labourers (33). Of 1 049 indigenous patients 562 were from the Federal District and 487 from other States 53.5 and 46.4 per cent. respectively. Of the total 1 507 976 (64.7) were in the infective stage and 531 (35.2) burnt out or non-infective.

In their conclusions the authors state that the disease is extending rapidly in the Federal District having increased by 50 per cent. in the past decade, that almost two-thirds are in the infective stages and that there is an alarming deficit in the possibilities of internment.

H H S

FONTE (Joir) A lepra no Hawaii Quinze anos de atividade do centro de leprologia de Honolulu (Hawaii)—(1925-1939) [Leprosy in Hawaii. Fifteen Years Work of the Honolulu Centre]—*Acta Med* Rio de Janeiro 1941 May Vol 7 No 5 pp 236-244 English summary (8 lines)

After discussion by the Health Authorities of Hawaii there was inaugurated in November 1885 the Kāhili Hospital and a Detention Station for lepers in the suburb of Honolulu. In 1905 a leprosy Investigation Station was opened and two years later a crèche was founded in Molokai. In 1908 a Kāhili Boys Home was established for children of lepers and in 1909 the leprosarium of Kālawau.

This paper gives brief notes of statistical returns and clinical forms of cases seen in the fifteen years 1925-39 the former for 1925 and 1927 which have little if any interest now the latter for the earlier years of the fourth decade of the century. Most of the figures refer to conditions of ten years or more ago and are not worth quoting here. Future papers will deal with laboratory epidemiological and bacteriological studies the treatment of the disease and with murine leprosy.

H H S

CHAUSSINAND (R.) Contributions à l'étude de la lèpre. I. Essais de culture du bacille de Hansen [Attempts to cultivate *Mycobacterium leprae*]—*Internat J Leprosy* Manila. 1941 Jan-Mar Vol. 9 No 1 pp 69-75

This is an account of a laborious seven years investigation of numerous culture media inoculated with leprosy material from 87 cases

of the disease. The media include those of most service in the culture of the tubercle bacillus and of fungi. Among the materials employed were oysters the flesh of fish cerebral matter and even human tissues provided by accidents, vitamins, and extracts of drivers organs of man and of bovine animals. Both aerobic and anaerobic methods were used and the pH of the media varied from 6.5 to 8.5. Apparent multiplication may result from disintegration of inseminated globi, but subcultures could not be obtained from them. Macroscopical cultures of acid-fast bacilli were obtained in three instances, but one was identified as a human tubercle bacillus of feeble virulence the other two were chromogenic paratuberculosis bacilli avirulent to guinea-pigs, etc. In addition, after eleven months a bacillus believed to be that of Hansen was obtained, but subcultures did not produce visible colonies. The composition of the medium used in the last case will be published in a future paper
L. R.

LOVING (Walker L.) Experimental Infection of the Rabbit with Duval's Chromogenic *B. leprae* Culture.—*Proc. Soc. Experim. Biol. & Med.* 1941 Feb. Vol. 46 No. 2. pp. 293-295

— The Experimental Infection of Rabbits with Duval's Chromogenic Acid-Fast Bacillus from Human Leprosy.—*Jl. Infect. Dis.* 1941 May-June. Vol. 68. No. 3 pp. 193-206 With 8 figs. [10 refs.]

These two papers deal with the same work, the second one in greater detail and with histological illustrations. The author reports the successful infection of rabbits by 2 cc doses of a heavy suspension of cultures of Duval's chromogenic bacillus of human leprosy but negative ones with two other acid-fast bacilli, *Mycob. phlei* and *Mycob. smegmatis*. The injections were made subcutaneously intraperitoneally or intravenously and repeated twice at weekly intervals. The animals were killed and examined at varying intervals and it was found that cultures were increasingly difficult to obtain in direct proportion to the length of the sojourn of the organism in the animal's tissue. While the gross lesions in the rabbits were not typical of human lesions the tissue microscopical changes were identical, with lymphoid, epithelioid and lepra or foamy cells. The infection was progressive over six to eight months, during which the micro-organisms steadily increased in numbers
L. R.

ITAKURA (Teijo) The Histo-Pathological Studies on Teeth of the Lepers, especially on its Gingiva and other Supporting Tissues.—*Japanese Jl. Med. Sci. Pt. V Pathology* 1940 Oct. Vol. 5 No. 3 pp. 201-220 With 11 figs.

[See this *Bulletin* 1941 Vol. 33, p. 218.]

LOWE (John) & CHATTERJI (S. N.). The Onset of Leprosy of the Lepromatous Type.—*Leprosy in India* 1941 Jan. Vol. 13 No. 1 pp. 14-17

The authors discuss the relative frequency with which lepromatous cases on the one hand commence with nerve symptoms, and on the other are lepromatous in nature from the first. The histories and clinical examination of 249 lepromatous cases

indicate that between 65 and 68 per cent started with lesions suggestive of the neural type of leprosy and subsequently developed into definitely lepromatous cases. In over half of these the original lesions were caused by nerve trunk involvement nearly one-third were in the form of patches with little or no erythema and thickening and the remainder about one-seventh showed the definite erythema and thickening usually associated with the more marked tuberculoid lesions. In view of the frequency of tuberculoid cases in Calcutta these findings probably indicate that major tuberculoid lesions rarely become lepromatous. The average duration of the neural phase is 3-4 years and long standing neural cases rarely become lepromatous.

L R

LOWE (J) & CHATTERJI (S N) The Development of Leprosy in a Child.—*Leprosy in India* 1941 Apr Vol. 13 No 2, p 68
With 1 plate

The patient was one of a family of eight persons—a mother and seven children. The father had died of leprosy and though the mother was healthy five of the children showed signs of the disease. In 1933 at the age of five the patient showed little more than depigmented patches on the buttocks, knees face hands and forearms but in 1940 there was diffuse lepromatous infiltration of the skin of the whole body some nodulation of the ears and many thickened nerves. This is an example of a common course of events.

C W

LOWE (J) & CHATTERJI (S N) An Abortive Case of Leprosy —
Leprosy in India 1941 Jan Vol. 13 No 1 p 30

During recent years the frequency with which leprosy may be abortive has been increasingly emphasized and such cases are common in India. Most of the lesions are of the neural type. The authors describe the case of a man who in 1933 showed only slight thickening and tenderness of the ulnar nerve without loss of sensation or anaesthetic patches. A ray showed that this was not due to a cervical rib and on exposing the nerve and opening its sheath smears were made which were found to contain a few acid-fast bacilli. After the operation the slight deformity which had been found in the bending of the little and ring fingers disappeared and there have now been no signs of the disease for seven years. It is not thought that this result can be attributed to the operation but that it is rather an instance of spontaneous arrest.

C W

LOWE (J) & CHATTERJI (S N) An Acute Onset of Leprosy of Lepromatous Type in a Man aged Seventy —*Leprosy in India* 1941 Jan. Vol 13 No. 1 p 29 With 1 plate

In India leprosy rarely appears late in life, and when it does, is usually of a mild form. The authors describe the case of a man of 70 who noticed numbness in his right foot and leg followed four months later by the appearance of thick red patches on the thigh face ears body and extremities. Both peroneal nerves were thickened and there were patches of anaesthesia. Smears from the face ear arm and

thigh showed acid-fast bacilli, and a lesion excised for biopsy proved to be a fairly typical leproma. The clinical findings support the patient's story the lesions all being obviously fairly new and acute.

C IV

VELASCO (Felix) Tuberculoid Leprosy Its Transformation to the Lepromatous Type.—*Internat J Leprosy* Manila. 1941 Jan-Mar Vol. 9 No. 1 pp. 91-100. With 13 figs. on 3 plates. [18 refs.]

The author records and illustrates the naked eye and microscopical changes in two cases of tuberculoid leprosy which developed into the lepromatous type, contrary to the contention of some recent writers. In the first the interval was from 1933 to 1939 and in the second from 1935 to 1940. Such cases are rare and he suggests that life-long studies of cases beginning in childhood are necessary for the study of the evolution of the disease.

L R

SARDJITO. Bacterioscopische lepra diagnose met daarmede samenhangende beschouwingen. (Bacterioscopic Diagnosis of Leprosy).—*Geneesk Tijdschr v Nederl Indië* 1941. Apr 1 Vol. 81 No. 13 pp. 739-748

DHARMENDRA & BOSE (R.) Complement-Fixation in Leprosy with Antigens prepared from Various Acid-Fast Bacilli.—*Indian J Med Res* 1941 Jan. Vol. 29 No. 1 pp. 7-21

"1 The work was undertaken to find out whether complement fixation tests done with sera from cases of leprosy and with antigen prepared by modern methods from the so-called cultures of leprosy would give any evidence regarding the relation of these isolated organisms to the disease.

"2 Complement-fixation tests have been performed in 112 cases of leprosy and 58 cases of other diseases in presence of antigens prepared from six different acid-fast bacilli including the so-called leprosy bacilli of Duval, Bayon, Kedrowsky and Lleras. All the antigens were prepared by the method by Witebsky, Klingenstein and Hum.

"3 Sera diluted 1 in 5 fixed complement in presence of all the six antigens, in 84 per cent. of the 19 cases of the lepromatous type 61.5 per cent. of the 13 bacteriologically positive cases of the neural type and 22.5 per cent. of the 80 bacteriologically negative cases of the neural type and all the eight cases of leishmania infection.

"4 In 1 in 5 dilution 21 per cent. of the 14 Wassermann positive sera and 30 per cent. of the 20 sera from cases of leucoderma fixed complement in presence of one or more but not all the antigens.

"5 With sera diluted 1 in 25 complement fixation is practically limited to cases of leprosy and kala azar. In this dilution, however the number of reacting sera of the neural type of leprosy is reduced markedly.

"6 All the six antigens appear to behave in a similar way but the antigen prepared from the Lleras bacillus appears to be slightly more sensitive. A slightly higher number of sera fix complement in its presence and dilution does not reduce complement-fixation with this antigen to the same extent as with the other antigens.

- 7 This greater sensitivity of the antigen prepared from *Lleras bacillus* does not appear to be caused by any specificity as it is seen both in leprosy and non leprosy cases
- "8 It is concluded that complement fixation tests have not given and are unlikely to give any evidence regarding the genuineness of cultures of organisms isolated from leprosy lesions

EAGLE (Harry) HOGAN (Ralph B) MOHR (Charles F) & BLACK (Samuel H.) On the Reactivity of the Serum and Spinal Fluid of Leprous Patients with Spirochaetal Suspensions.—*Amer Jl Syph* 1941 July Vol. 25 No 4 pp 397-405

The authors confirm and extend the observation of CAPPELLI that leprosy cases give negative complement-fixation tests for syphilis with a suspension of cultured spirochaetes (*Spirochaeta pallida* Reiter strain) as an antigen instead of a mammalian tissue extract. The frequent positive Wassermann tests in non-syphilitic leprosy patients can thus be differentiated from true syphilitic reactions in which there is response to both antigens. Thus of 37 leprosy patients giving positive flocculation tests 25 of whom were also positive to the Wassermann test, all but six were negative to complement fixation tests. Moreover the serological reactivity of Wassermann positive syphilitic and leprosy sera differed in that the latter tended to give a disproportionately high titre in a Wassermann as compared with a flocculation test. This was found to be the case in three of six positive spirochaetal reactions in leprosy patients so only the remaining three were probably syphilitic. The spinal fluids obtained from nine leprosy patients were completely negative to all the tests used.

L R.

COCHRANE (R. G) RAJAGOPALAN (G) SANTRA (I) & RAJ (M. Paul) A Study of the Lepromin Reaction in Children with Special Reference to Contact.—*Leprosy in India* 1941 Jan Vol. 13 No 1 pp 5-13

The authors report on lepromin tests in 276 Madras children and in 471 inmates of the Lady Willington Leprosy Sanatorium. Readings were taken once a week for six or more weeks and reactions measuring less than 5 mm were considered to be of little significance. Tables record the reactions in different types of the disease. Special attention was paid to the question of contact with leprosy persons in relation to the development of reactions. In discussing this the conclusion is negative lepromatous cases should be excluded and the conclusion is arrived at that the lepromin reaction tends more often to be negative in those in whom a history of contact is maximal but the reaction is not significantly influenced by hereditary predisposition. The most important factor in breaking down cellular resistance in leprosy is continuous contact with an open case

L R.

WADE (H W) The Lepromin Reaction in Normal Dogs Preliminary Report.—*Internat Jl Leprosy* Manila. 1941 Jan-Mar Vol. 9 No 1 pp 39-56. With 1 folding fig [20 refs.]

The author confirms and extends the observations of RODRIGUEZ that the dog reacts positively to intracutaneous infection of lepromin and therefore offers a convenient medium for a study of the Mitsuda reaction.

The curve of the reaction shows an immediate nonspecific oedematous reaction with recession in two days. After a variable period of latency usually of about seven days duration occurs the onset of the definitive reaction consisting of three phases—primary development, height of activity on the average at the end of the third week, and finally recession in six to eight weeks. Reinjections have a disturbing effect in the second unstable period, but not in the recessive stage. It is concluded that this reaction, while of an allergic nature is not one of hypersensitiveness, but rather one of capability of developing an allergic state after the introduction of the antigen. The specific feature of leprosy is the loss of that capability in lepromatous cases. L. R.

COLLIER (D. R.) The Use of Diphtheria Toxoid in the Treatment of Leprosy. Second Report.—*Internat. J. Leprosy* Manila. 1941 Jan-Mar Vol 9 No 1 pp 1-10 With 6 figs. on 1 plate.

This is a further report from Thailand on the trial of injections of diphtheria toxoid in leprosy (see this *Bulletin* 1941 Vol 38 p 26). Over 600 leprosy cases have now been treated for periods ranging between a few weeks to 10 months and it is claimed that the "results far exceed any obtained by me with any other method or combination of methods. In early cases treated for six months or more 50 per cent. have become symptom free as judged by bacteriological examination, the condition of the skin lesions, areas of anaesthesia, and the patient's general condition. The more advanced cases show definite improvement in a high percentage of cases according to the same standards. Photographs of two cases showing great improvement are given [see below for other less favourable trials] L. R.

MOUSER (B.) Report on Trial Treatment of Leprosy with Diphtheria Anatoxins Ramon.—*Leprosy Review* 1941 July Vol 12 No 3 pp 54-56

This experienced worker reports on 19 cases of leprosy treated with diphtheria anatoxin in Southern Rhodesia. He began with 1 cc. weekly and increased by 1 cc. to a maximum of 4 cc. weekly each increase being made on the average at the end of six weeks. All the patients complained of pains all over the body and particularly in the knees and ankles. The experiment was finally stopped at the request of the patients and because the majority did not show any improvement. An analysis of the 19 cases shows that six were worse and 11 showed no improvement or no change. Of the remaining two one showed ulceration and disappearance of a few of the nodules, but the general mass of the lesions remained unaffected and there was no improvement in the neural signs, so that any improvement was slight. The remaining case showed only a few small lepromata, which disappeared, so definite improvement took place, but the author observes that she was the type of case that improves rapidly under moogrol. [The reviewer has received unpublished reports from Dr. E. Muir and others in which the results were uniformly unsatisfactory and completely failed to confirm the claims of the Thailand (Siam) workers, whose last report only claims 50 per cent. of recoveries in early cases, or much fewer than Mouser and others have recorded from the use of chaulmoogra preparations in that class of case.] L. R.

DAVISON (A. R.) Blood Transfusions in the Treatment of Leprosy — *Leprosy Review* 1941 Apr Vol 12. No 2. pp 32-40 With 12 graphs.

This careful trial of blood transfusions in leprosy at the Pretoria Institution in South Africa was carried out at the request of the seven European patients there. Six intravenous injections of from 350 to 400 cc of blood were given at intervals of one month after the necessary tests had been carried out by the Rand Blood Transfusion Service. Only one patient, whose first test proved to be erroneous showed temporary untoward symptoms. It was hoped either to build up the patients' resistance or perhaps to stimulate their reticulo-endothelial system. Most of the cases were fairly advanced lepromatous ones with a bad prognosis. Periodical estimations were made of the sedimentation index, blood corpuscles, haemoglobin, clinical and bacteriological conditions, some of which are illustrated by charts. The results were disappointing as in only one case was fleeting benefit noted and in two the condition continued to grow worse. It has not yet proved possible to make use of the blood of arrested cases of leprosy.

L. R.

KUZNÉZOV (V. N.) Experience with the Naphthalan Oil Bath Treatment of Leprosy — *Internal J. Leprosy* Manila. 1941 Jan-Mar Vol. 9 No 1 pp 23-28.

This is a report on the use of medicinal baths of naphthalan oil in the Caucasian regions of Russia, where alone it occurs. It adheres firmly to the skin and cannot be washed off with water. The leprosy patients are immersed in it up to the breast at a temperature of 40° [scale not mentioned] for 10 to 15 minutes after which the oil is scraped off and the patient lies in the sun to produce profuse sweating. Two series of ten baths with five to ten days intervals between the two sets is advised during which the patient does not wash. It is claimed that this treatment gave stable effects in almost all cases with more rapid improvement than with any other treatment (unspecified) used in the leprosarium.

L. R.

BALISA (Pedro) & BASOMBRIO (Guillermo) Removal of Solitary Lesions in Tuberculoid Leprosy — *Internal J. Leprosy* Manila 1941 Jan-Mar Vol 9 No. 1 pp 11-14 With 8 figs. on 2 plates.

In this report is tabulated information on 14 cases in which primary lesions of a tuberculoid nature including one in which a nerve alone was involved were removed. Relapse occurred in only one of 12 followed up for periods of from one year and seven months to eight years and eight months. In seven other cases tuberculoid lesions were destroyed by the galvano-cautery (in three) by electro-coagulation (in three) and in one a thickened nerve was also removed. None of these had relapsed in periods from two and a half to nine months. All the patients received in addition regular chaulmoogra treatment and the only relapse was in a patient who did not go on with the injections. Illustrations of some of the cases are given. The authors are favourably impressed with the results so far obtained.

L. R.

MUIR (E.) A Note on the Treatment of Lepromatous Ulcers.—*Leprosy Review* 1941 Apr Vol. 12, No. 2, pp. 40-41

The author records that he found a surprisingly large number of lepromatous ulcers in the Chacachacare leprosarium of Trinidad, as compared with India, where trophic ulcers are by far the more common. They were due to breaking down of nodules and diffuse lepromata, with discharge of masses of lepra bacilli. A large part of the nursing sister's time was taken up by the dressings. He was led by reports of success in treating burns with silver nitrate, tannic acid and gentian violet to try these applications, and obtained highly satisfactory results in lessening the loss of time of the staff and the danger of spreading infection. He advises first painting with a 1 per cent. solution of gentian violet or methyl violet in alcohol then with a 10 per cent. solution of silver nitrate in water followed by a 15 per cent. watery solution of tannic acid three or four times on the first day, later usually one painting with tannic acid, with or without the use of a dye solution, suffices. Ulcers rapidly begin to heal up including those on the lips or face greatly to the comfort and cheerfulness of the patients. L. R.

SLOAN (Norman R.) The Use of Urea in the Treatment of Perforating Ulcer.—*Internat. Jl. Leprosy* Manila 1941 Jan-Mar Vol. 9 No. 1 pp. 15-22. [11 refs.]

The author was led by a report on the value, in the treatment of purulent wounds, of a 2 per cent. solution, or a 15 per cent. ointment or jelly to try a treatment of leprosy perforating ulcers which consisted of daily packing with urea and instilling a saturated solution into sinuses. In 80 negro patients 80 per cent. healed, against 60 per cent. with other methods. L. R.

SEX (P.) Leprosy. A Review of the Reports of Various National and International Conferences on Leprosy.—*Calcutta Med. Jl.* 1941 Mar Vol. 38, No. 3, pp. 136-143.

Opinion is unanimous that leprosy is infectious, spread chiefly if not entirely by direct contact, and that leprosy can be controlled only by isolation of infectious cases particularly from children and young people, isolation measures however being augmented by treatment, propaganda and welfare work of various kinds.

DAVEY (T. F.) A Repeated Leprosy Survey in Southeastern Nigeria. The Progress of Untreated Cases of Leprosy.—*Internat. Jl. Leprosy* Manila. 1941 Jan-Mar Vol. 9 No. 1 pp. 77-86.

This is an account of the progress of an untreated series of cases between two surveys, in south-eastern Nigeria. With the cordial help of the chiefs a house-to-house survey was made in 1937 and repeated in 1939 in a large and very insanitary village including a neighbouring leper village in which the people themselves had isolated the most advanced cases 10 years before. The incidence of the disease at the first survey was 6 per cent., raised at the second by the discovery of some additional cases, in persons absent at the first to 6.7 per cent. Two years later the incidence had fallen to 5.7 per cent. apparently as the result of the village segregation, but 10 new cases had developed.

On comparing the full notes of the cases and of bacteriological examinations at each survey and classifying them according to the Cairo Congress nomenclature the progress during two years in the absence of treatment is shown in a table of 118 persons. Deaths amounted to 18 six of them from smallpox. Thirty three patients were worse 39 stationary and 28 had improved. Thus no less than 67 per cent were stationary or had improved. All but three of the improved cases were of the tuberculous and simple macular neural type. The three improved lepromatous cases were macular ones. All the infectious patients have now been accommodated in the model leper village built by themselves under supervision where they are living happily. It is hoped to make a further survey in two years time to ascertain the results of these measures which now include regular treatment at a newly established clinic.

L. R

ROGERS (Leonard) The Problem of Children born in Leprosy Colonies and Villages.—*Leprosy Review* 1941 July Vol. 12. No 3 pp 50-53

The author points out that among backward races of Africa and Korea male leprosy patients will refuse to enter colonies unless accompanied by their wives. This results in children being born to them who are gravely exposed to infection from their parents thus maintaining the incidence of the disease. He draws attention to the successful solution of this problem in the Korea settlement under Dr R. M. Wilson through voluntary sterilization of the male partner and suggests its more general adoption under such circumstances. [See this *Bulletin* 1935 Vol 32 p 858 and 1937 Vol. 34 p 602.] L R

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION

CASTELLI (p 708) reports on relapses which have occurred in men repatriated to Italy from East Africa. Although most of the infections were almost entirely due to *P. vivax* BRAMBILLA (p 709) states that in Durr Dava malaria is only slightly endemic and that it is due more to *P. vivax* than *P. falciparum*. He notes that relapsing fever is relatively common and incidentally that *Aedes aegypti* is widely diffused. Anophelines are few in numbers but *A. gambiae* is found. MOISE (p 709) reports on malaria in Assab Eritrea.

PAMPANA and CASINI (p 710) report on an epidemiological study in Sardinia where *A. maculipennis labranchiae* is the vector. The first wave of subtertian fever in the epidemic season in July is due to new infections the number of crescent carriers before this time being sufficient to account for the outbreak.

FARID (p. 710) shows that on the eastern side of the Nile delta *A. sergenti* is commonly found and is frequently infected. *A. pharocensis* usually regarded as the vector is rare and is not commonly infected. Subtertian malaria is the predominant variety. SEN (p 711) reviews the anophelines of Assam. *A. minimus* is responsible for the intense malaria of the foothills. *A. philippinensis* for that of the

upper deltaic regions and *A. swainsoni* for that of the coastal area. *A. culicifacies* though widespread, appears to be of no importance as a carrier.

LIEM TJAIJ TIE (p. 711) reports seven cases of congenital malaria in the Dutch East Indies and PIK GING HOO (p. 711) one from Amsterdam. Details of the latter are given.

NARAYAN (p. 712) records a case of cerebral malaria in which meningitis was simulated.

DE LEON (p. 712) reports favourably on a preparation of sulphanilamide in subtertian malaria.

GRANETT (p. 713) describes a method of estimating the repellent power of chemicals for mosquitoes and describes the effects of a proprietary preparation which was found to be considerably more useful than citronella oil and certain other preparations.

RITA (p. 714) notes that chick embryo cannot be infected with *P. gallinaceum*.

TALIAFERRO and TALIAFERRO (p. 714) show that, in chickens, immunity acquired against *P. lophurae* can be passively transferred provided sufficient doses of immune serum are used and continued over a sufficient period.

DAS GUPTA and SIDDOXS (p. 715) describe a *Plasmodium* and a trypanosome from the Munda.

C IV

BRAMBILLA (A.) MARA (L.) & CAMPISI (P. Marino) Istituto di un centro di studi in A.O.I. [A Research Centre in East Africa.]—*Riv. di Malariaologia*, Sez. I 1940 Vol. 19 No. 5 pp. 336-344 With 6 figs. English summary.

"The Ettore Marchesani Malaria Institute has extended its activity to the Italian East Africa territory. After a preliminary survey carried out in 1936-1937 many fundamental epidemiological data have been collected setting in evidence the need of carrying out systematic studies in several zones to be exploited. During the following years, the procedure was fixed with the Italian Africa Ministry and with the General Government of Italian East Africa in view of establishing a Research Centre of the Institute in Africa. In 1939 three Research Stations have been organized, namely at Dire Dawa (Harar) Agordat (Erythraea) and Genale (Somaliland).

"Descriptions are given of the Stations, of the equipment and of the area under control."

CASTELLI (G. D.) Le recidive malariche nei reduci dall' Africa Orientale [Malaria Relapses among Men Repatriated from East Africa.]—*Riv. di Malariaologia*, Sez. I 1940 Vol. 19 No. 5, pp. 310-317 [27 refs.] French summary (9 lines).

Between January 1937 and August 1939 eighty-eight patients were admitted to the Military Hospital of Padua suffering from relapses of malaria, the infection of which had been acquired during service in East Africa. These cases were studied with special reference to the intervals that had elapsed since the date of infection. The author concludes that febrile relapses are rare after 15 months from the date of infection, and exceptional after two years. *P. vivax* was responsible for a ten-fold greater number of these relapses than was *P. falciparum*.

though infection with the latter is most common in the East African territories in which infection was acquired. No patients with relapses of *P. malariae* infection were admitted to hospital during this period

Norman White

BRAMBILLA (A.) Il problema della malaria a Dire Dawa [The Problem of Malaria in Dire Dawa].—*Riv di Malarologia* Sez I 1940 Vol. 19 No 5 pp 290-309 With 7 figs English summary

Dire Dawa is situated at a height of about 1,200 metres. The European and native quarters of the town are separated by a river bed. The population of the former was about 3 500 plus a variable number of Italian troops. The population of the native quarter was about 15 000 a mixed and in part a nomadic population. When the author assumed charge of the local Malaria Research Station in 1939 he was asked to make an immediate study of the malaria situation. Malaria was said to have been extremely prevalent the previous year. The results of his investigations are described.

Malaria is only mildly endemic in Dire Dawa. In the past other diseases have been responsible for errors in diagnosis. At certain seasons of the year dengue is very prevalent. *Aedes aegypti* is widely diffused. The blood of 973 patients, in whom the symptoms justified a suspicion of malaria infection was examined. In only 239 of these were malaria parasites found. In 9 per cent of the total, spirochaetes of relapsing fever were found, mostly in October and November. Further evidence of the moderate endemicity of malaria is given by the spleen index, 17 per cent and the parasite index 15.6 per cent. of 835 children under 14 years of age. Of the positive blood smears from these children 68 per cent. contained *P. vivax* and 34 per cent *P. falciparum*.

Adult anophelines were found only in native huts and even there only in limited numbers. A few *A. gambiae* could be found at all times of the year. Other species found were *A. d'thai*, *A. pretoriensis*, *A. cinereus* and *A. turkhu*. The only important breeding places were found in the bed of the Harré torrent which is three kilometres east of the native town. Prophylactic measures including antilarval measures and mechanical protection of dwellings based on the results of this inquiry were put into operation and had already achieved encouraging results.

N W

MOISE (Regolo) Osservazioni sulla malaria di Assab e sull'anofelino che la trasmette. [Observations on Malaria in Assab and on the Anopheline which transmits it].—*Riv di Malarologia* Sez I 1940 Vol. 19 No 3 pp 149-158. With 5 figs. English summary

The observations recorded refer to the period December 1935 to April 1936. During this period among the Italian naval personnel averaging about 500 in Assab Eritrea there were 25 cases of malaria 15 *P. vivax* and 10 *P. falciparum* infections. The adult native population appears to suffer but little from malaria. The spleen index of 97 native children was 41 per cent and the parasite index of 85 children

case was one of indigenous benign tertian malaria originally contracted in the northern district of Amsterdam. Comparatively few instances of this kind have previously been reported in Holland. The exact mechanism by which transplacental infection of blood protozoa may take place is still a matter of conjecture. Some have considered that there must be some mechanical tear or damage so that a sharp separation between maternal and foetal blood no longer exists. It is possible as suggested here that the malarial infection induces pathological changes in the placenta itself thus facilitating passage of the parasites or it may be that it takes place through a placental haemorrhage.

It is obvious that before a genuine case of transplacental infection can be obtained it is necessary that the child should be born in a locality where malaria is non-endemic and where no anopheline vectors abound. On the other hand, if such a case were to be observed in an endemic area it should occur at a time of the year during which potentially infective anophelines are absent. A further provision may be stipulated that the interval elapsing between birth and demonstration of parasites in the blood should be considerably shorter than the known incubation period.

In August 1940 an infant, 14 days old, was admitted to the Pediatric Clinic in Amsterdam with a suspicion of quinine poisoning as the mother suffered from severe postpartum recurrence of malaria (benign tertian) originally contracted in Amsterdam and for which she had taken large doses of quinine. The child, which was also found to be suffering from congenital heart disease and *icterus neonatorum* had slight fever. At the age of 20 days ring forms of *P. vivax* were found in the blood and on the 24th day large numbers of gametocytes. Death took place some 80 days after birth presumably due to double *otitis media*. Diffuse malarial pigmentation was present in the liver and spleen.

There is one loophole in the evidence—namely that the infant may have been bitten by an infected *Anopheles* mosquito after birth, but on several grounds this is ruled out as being unlikely. *P. Manson-Baker*

NARAYAN (Jagdish). Cerebral Malaria simulating Meningitis.—*Indian Med. Gaz.* 1941 Feb. Vol. 76. No. 2. p. 94.

In this case the cerebrospinal fluid was under pressure, but clear the signs of meningitis were present and *P. falciparum* was found in the blood. Quinine sulphate, both intramuscularly and by the mouth, failed to control the fever but on the tenth day after admission atabrin was given and the patient became afebrile in 48 hours, after which he completely recovered.

C. IV

DE LEON (Arrovario Diaz). El paludismo y su tratamiento intravenoso por las sulfanilamidas. [The Treatment of Malaria with Intravenous Injections of Sulphanilamide Preparations.]—*Medicina Mexico* 1940 Nov. 10. Vol. 20. No. 375. pp. 551-558. [28 refs.]

The author discusses the relative merits and limitations of quinine, atabrin and plasmoquine in the prophylaxis and treatment of *P. vivax* and *P. falciparum* infections. In acute attacks of the latter sulphanilamide is a useful substitute for atabrin in special cases in which

intravenous medication is indicated. Sulphanilamide is exclusively schizonticidal. Five illustrative cases are described. The sulphanilamide preparation used was ambesid. N IV

CHOPRA (R. N.) HAYTER (R. T. M.) SEX (B.) & TALUKDAR (M.). Crinodora (Palusan) nella lotta contro la malaria in India. (The Use of Crinodora in Malaria in India.)—*Riv di Malarologia* Sez. I 1940 Vol. 19 No 4 pp 251-255 English summary (7 lines)

See this *Bulletin* 1941 Vol. 38 p 34

GRANETT (P.) Studies of Mosquito Repellents, I. Test Procedure and Method of evaluating Test Data.—*Jl Econom Entom* 1940 Vol. 33 No 3 pp 563-565 With 2 figs. II. Relative Performance of Certain Chemicals and Commercially Available Mixtures as Mosquito Repellents.—*Ibid* pp 566-572 [Summarized in *Rev Applied Entom* Ser B 1941 Apr Vol 29 Pt 4 pp 65-66]

The first paper contains a description of the procedure used in investigations begun in New Jersey in 1935 for testing the repellency of chemicals to mosquitos in the field in conditions as near normal as possible and the method of evaluating the results. An untreated arm or leg is exposed to biting for a definite period, usually 2 minutes. A measured quantity of the chemicals to be tested is then applied to the other arm or leg and it is exposed for the whole period of the test while the untreated limb is exposed for 2 minutes at intervals of $\frac{1}{2}$ to $\frac{1}{3}$ hour. The average number of bites per minute on the untreated area is called the biting frequency during the test period. The time in minutes required to obtain the first bite on the treated area is called the repellent time. This time is the customary measure of the effectiveness of a repellent but changing factors in the field cause it to fluctuate. An increase in biting frequency is correlated with a decrease in repellent time. Curves are given which show this relationship for four repellents. For any pair the difference between their repellent times at a given biting frequency is approximately constant. At the highest biting frequencies the decrease in repellent time is relatively slight. For purposes of comparison the most satisfactory product developed during the investigation and known under the brand name of Sta Way Insect Lotion is used as a standard. The repellent rating of a material is its repellent time expressed as a percentage of that of the standard at the same biting frequency. If the product is compared with the standard at several biting frequencies the repellent ratings are averaged.

In the second paper the literature on repellents is reviewed and the properties desirable in an ideal one are given. As none was available possessing anything approaching the qualities named the investigations previously referred to were begun to discover or develop a better substance. Nearly 1 000 selected organic chemicals and chemical mixtures and about 40 proprietary products were tested chiefly against *Aedes sollicitans* Wlk. and *A. cantator* Coq. and the highly satisfactory one referred to in the previous paper was developed. Its active ingredients are diethylene glycol monobutyl ether acetate and diethylene glycol monoethyl ether and represent 65 per cent. of the whole and it also contains ethyl alcohol, maize oil and perfume. Its repellent time (67-136 minutes at biting frequencies of 26-1) was considerably longer than that of any other usable compound tested. It has a pleasing odour.

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C IV

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N 17

CHOPRA (R. N.) HAYTER (R. T. M.) SEN (B.) & TALUKDAR (M.) *Crinodora* (Palusan) nella lotta contro la malaria in India [The Use of *Crinodora* in Malaria in India.]—*Riv di Malariologia* Sez. I 1940 Vol 19 No 4 pp 251-255 English summary (7 lines)

See this *Bulletin* 1941 Vol 38, p 34

GRANETT (P.) Studies of Mosquito Repellents, I. Test Procedure and Method of evaluating Test Data.—*Jl Econom Entom* 1940 Vol. 33 No 3 pp 563-565 With 2 figs II. Relative Performance of Certain Chemicals and Commercially Available Mixtures as Mosquito Repellents.—*Ibid* pp 566-572 [Summarized in *Rev Applied Entom* Ser B 1941 Apr Vol. 29 Pt. 4 pp 65-66]

The first paper contains a description of the procedure used in investigations begun in New Jersey in 1935 for testing the repellency of chemicals to mosquitos in the field in conditions as near normal as possible and the method of evaluating the results. An untreated arm or leg is exposed to biting for a definite period usually 2 minutes. A measured quantity of the chemicals to be tested is then applied to the other arm or leg and it is exposed for the whole period of the test while the untreated limb is exposed for 2 minutes at intervals of $\frac{1}{4}$ to $\frac{1}{2}$ hour. The average number of bites per minute on the untreated area is called the biting frequency during the test period. The time in minutes required to obtain the first bite on the treated area is called the repellent time. This time is the customary measure of the effectiveness of a repellent but changing factors in the field cause it to fluctuate. An increase in biting frequency is correlated with a decrease in repellent time. Curves are given which show this relationship for four repellents. For any pair the difference between their repellent times at a given biting frequency is approximately constant. At the highest biting frequencies the decrease in repellent time is relatively slight. For purposes of comparison the most satisfactory product developed during the investigation and known under the brand name of Sta Way Insect Lotion is used as a standard. The repellent rating of a material is its repellent time expressed as a percentage of that of the standard at the same biting frequency. If the product is compared with the standard at several biting frequencies the repellent ratings are averaged.

In the second paper the literature on repellents is reviewed and the properties desirable in an ideal one are given. As none was available possessing anything approaching the qualities named the investigations previously referred to were begun to discover or develop a better substance. Nearly 1 000 selected organic chemicals and chemical mixtures and about 40 proprietary products were tested chiefly against *Aedes sollicitans* Wlk. and *A. cantator* Coq. and the highly satisfactory one referred to in the previous paper was developed. Its active ingredients are diethylene glycol monobutyl ether acetate and diethylene glycol monoethyl ether and represent 85 per cent. of the whole and it also contains ethyl alcohol maize oil and perfume. Its repellent time (67-136 minutes at biting frequencies of 26-1) was considerably longer than that of any other usable compound tested. It has a pleasing odour.

does not affect natural fibres, is non-irritant and not greasy or unsightly on the skin and is effective against many other blood-sucking pests though usually not for so long as against mosquitoes. On the other hand, it injures paints, varnishes, lacquers and certain plastics and affects cellulose-acetate fibre. The four products that ranked next to it in effectiveness were a proprietary product containing citronella oil, one containing synthetic organic repellents, undiluted citronella oil and medium-fraction steam-distilled pine oil. Their repellent ratings were respectively 80 66 65 and 59 per cent. The superiority of the proprietary product over undiluted citronella oil is attributed to its extremely viscous properties. The best of the pyrethrum mixtures tested had a repellent rating of only 41 per cent and moreover during part of the time for which the mosquitoes were repelled from sucking blood they used to alight on the limb pierce the skin and fly away without feeding. This piercing of the skin is almost as annoying as an actual bite.

COVA-GARCIA (Pablo). La legislación antimalaria venezolana. provento de reglamentación. (Anti-Malaria Legislation in Venezuela.)—Publicaciones de la División de Malaria. Ministerio de Sanidad y Asistencia Social. Caracas 1940. Dec 13 No 8 34 pp. (Bibliography.)

RITA (Geo). Tentativi di infezione dell'embrione di pollo con *Plasmodium gallinaceum*. [Attempts to Infect Fowl Embryos with *P. gallinaceum*.]—Riv. di Malaria. Sez. I 1940 Vol. 19 No 4 pp. 230-233. English summary.

The author has tried experiments for artificially infecting chick embryos with *Plasmodium gallinaceum*. He has always obtained negative results, confirming what had formerly been found by CHODURA and by W. GAYLOR and co-workers. On the contrary he was able to provoke a severe infection in newly hatched chicks. The reasons for this different behaviour are discussed.

TALIAFERRO (William H.) & TALIAFERRO (Lucy Graves). Active Passive Immunity in Chickens against *Plasmodium lophurae*.—*Infect. Dis.* 1940 Mar-Apr Vol. 68 No 2 pp. 153-160. With 3 figs. [21 refs.]

The experiments recorded were carried out with a strain of *Plasmodium lophurae* in young chicks. The infection is a benign one in that recovery by crisis occurs. Thus a six-week-old chick receiving intra-venously a dose of infected blood resulting in the presence in its blood next day of 33 parasites per 10 000 red cells showed a steady increase of parasites till on the fifth day 590 per 10 000 red cells were present. The crisis was reached at this stage so that 48 hours later only one parasite per 10 000 red cells was present. A few were found during the next 48 hours but none later. That parasites are still present in such recovered chicks was proved by the infectivity of blood up to as long as four months. During this latent period there is a high degree of immunity to superinfection. Serum from such latently infected chicks, if injected along with parasites and continued daily during the period of usual rise in number of parasites, definitely suppressed the

infection. This passive immunity is greater if in the first place the immune serum and parasites to be injected are before injection incubated together for some time. It was noted that chickens older than six weeks exhibited some degree of natural resistance to infection and evidence was obtained to suggest that there may be some natural antibodies in some normal sera. The clear result of the experiments is the demonstration that acquired immunity can be passively transferred provided sufficient doses of immune serum are used and continued over a sufficient period.

C M WENNER

DAS GUPTA (B M) & SIDDOVS (L B) On a *Plasmodium* sp of the Malay Chestnut-Bellied Munia [*Munia Atricapilla atricapilla* (Vieill.)]—*Indian Med Gaz* 1941 Mar Vol 76 No 3 pp 148-150

— & — On a Trypanosome of the White-Throated Munia.—*Uroloncha malabarica* (Linn.)—*Ibid* pp 151-152 With 1 plate

In these two papers the authors describe and illustrate in a coloured plate certain blood parasites of birds in India.

In the first is given a description of a malarial parasite of *Munia atricapilla atricapilla* which had been imported to India from Malaya. The parasite resembles very closely the classical *Plasmodium praecox* but differs in certain details such as the number of merozoites. Further more it is not inoculable to the Indian house sparrow while the canary is only slightly susceptible. The white-throated munia (*Uroloncha malabarica*) is even more susceptible than the original host. As the classical form is readily inoculable to the sparrow and canary the authors consider that the present form is a variety which they propose to name *Plasmodium praecox* var *muniae*. It is reported that a haemoprotozoan and a trypanosome were encountered in *U. malabarica* a toxoplasma in the sparrow and a microfilaria in *M. atricapilla atricapilla*.

In the second paper the trypanosome of *U. malabarica* is described in detail. Though it resembles in many respects *Trypanosoma hannai* of the domestic pigeon of India it is regarded as a distinct species for which the name *Trypanosoma knowlesi* is proposed.

C M H

PELLAGRA AND ALLIED CONDITIONS

PRÉcis OF ABSTRACTS IN THIS SECTION

DÍAZ RUBIO (p 716) refers to pellagra and other deficiency diseases in Madrid during the Spanish Civil War. CARRUTHERS (p. 717) points out that in India pellagra is probably more common than is suspected.

KOOSER and BLANKENHORN (p 717) investigated the diet in a rural area in Kentucky where pellagra had been endemic but from which the

condition has now disappeared, and in an adjacent mining area in which it still persists. The better diet in the rural area is ascribed to education in the use of available foodstuffs by members of the Frontier Nursing Service.

SMITH *et al.* (p. 718) describe a condition (dysebacia) in pellagra, in which the mouths of the sebaceous glands are plugged with inspissated sebum giving the skin a rough appearance. This is usually seen on the face but there is another condition, phrynoderma of the shoulders and extremities which is also associated. Dysebacia is readily cured by autoclaved yeast and crude extract of liver.

From a study of cases in China Hou (p. 719) concludes that ocular lesions associated with pellagra are due to ariboflavinosis, while cheilosis is due to ariboflavinosis plus a minor deficiency of nicotinic acid. SYDENSTRICKER (p. 719) discusses the eye lesions associated with riboflavin deficiency of which the earliest and most constant is superficial vascularization of the cornea, which may progress to interstitial keratitis. SPIES *et al.* (p. 720) discuss the symptoms of ariboflavinosis observed in children in an area of Alabama where deficiency diseases are common.

URABE (p. 720) found evidence of liver damage in a high proportion of pellagrous patients—the damage is apparently proportional to the intensity of the various symptoms.

Cases of human black tongue are described by WILKINSON and by MIDDLETON and MILROY (p. 721) but whereas the condition in the patient referred to by the first author responded to nicotinic acid (although the diet had previously been good) that in the patient described by the others cleared up after the removal of a diseased tooth.

NAGANNA *et al.* (p. 721) describe a modification of a method of estimating nicotinic acid in the urine and quote their findings in normal and pellagrous persons.

TROWELL (p. 722) in a discussion of pellagra and certain allied conditions observed in African children, considers that all these should be included under the heading of pellagra. He discusses the meaning of the terms 'mosaic skin' and 'crazy-pavement skin'. MCKENZIE (p. 722) found 'crazy-pavement skin' in conditions not associated with any other sign of malnutrition. It was rarely associated with signs of lack of vitamin A.

C 11'

DÍAZ RUIZ (M) Estudios sobre la enfermedad de Casal (pellagra) — Nota previa [Studies in Pellagra—Preliminary Note.]—*Revista Clínica Española* Madrid 1941 Feb 1 Vol. 2 No 2 pp. 161-162.

The author remarks that from 1936 to 1939 the food supply in Madrid was grossly deficient in quality and quantity. He discusses the aetiology of pellagra and states that "para-pellagrous" states were commonly seen in Madrid, characterized particularly by lesions of the nervous system. Other deficiency conditions were famine oedema, hemeralopia, hyperkeratosis and anaemias, while minor degrees of scurvy were common. There were no cases of beriberi in spite of the fact that the diet was deficient in vitamin B₁. The author promises further discussion of these matters in later papers. [See also this *Bulletin* 1941 Vol. 38 p. 401.]

C 11'

CARRUTHERS (L B) *Pellagra in India.*—*Trans Roy Soc Trop Med & Hyg* 1941 July 3 Vol 35 No 1 pp 21-34 [19 refs.]

As has been pointed out before the paucity of records of pellagra in India is probably no measure of the incidence of the disease in that country. In the article under review notes of ten representative cases admitted to the Miraj hospital, Bombay Presidency are given cases chosen from a large series coming under observation during the past two years most of which belonged to the so-called subclinical group. These notes will serve to draw the attention of other medical practitioners in India, who may be unfamiliar with pellagra to the kind of clinical picture they should be on the look out for

H S Stannus

DEWAN (John G) *The Etiology of Pellagra.*—*Amer Jl Psychiatry* 1941 Mar Vol. 97 No 5 pp 1188-1193 [25 refs.]

This is a good summary of early views and recent work on the subject. It contains nothing new

C IV

KOOSER (John H) & BLANKENHORN (M A) *Pellagra and the Public Health. A Dietary Survey of Kentucky Mountain Folk in Pellagrous and in Non Pellagrous Communities.*—*Jl Amer Med Assoc* 1941 Mar 8 Vol. 116 No 10 pp 912-915 With 1 fig [Summary appears also in *Bulletin of Hygiene*]

Pellagra is still endemic in certain regions. Its occurrence is bound up with many factors determining the scale of living. The opportunity arose to investigate the social conditions in a rural area in Kentucky where pellagra was endemic and has now disappeared along with an adjacent coal-mining area where endemic pellagra is still present. Both areas have a large amount of unemployment. The dietary survey was made in the late winter and spring when the diet is at its worst. The cash income was considerably less in the rural than in the urban area but the consumption of pellagra producing foods (fat pork, beans and corn meal) was about equal in both areas. The consumption of pellagra-preventing foods was however greater in the rural area (half of the families owning some land) where livestock production was much greater than in the urban area. An important difference was in milk consumption. In the coal mining area the amount of fresh cow's milk consumed was negligible compared with that of the rural area and also less eggs, lean pork and chickens were eaten. The better diet in the rural area accounts for the absence of pellagra but the improvement in the diet of this area where economic conditions are very poor had to be accounted for. It is due to the advent of the Frontier Nursing Service in this community. The Nursing Service has greatly improved the health in regard to infectious, parasitic and particularly nutritional diseases. Pellagra disappeared without any economic improvement because the population had been educated to choose the right foods available in their particular district. The mere prescribing of a good diet or nicotinic acid is not the whole solution of the pellagra problem

H N H Green

SMITH (Susan Gower) SMITH (David T.) & CALLAWAY (J. Lamar)
Dysfunction of the Sebaceous Glands associated with Pellagra.—
Jl Investigative Dermat. 1941 Feb Vol 4 No 1 pp
23-40 With 2 figs. [34 refs.] [Discussion pp 40-42.]

In addition to typical dermatitis many pellagrins present a different type of skin lesion, involving the sebaceous glands which occurs mostly on the face and is independent of any effects of radiant energy. This is characterized by the development of innumerable plugs of inspissated sebum which project from the orifices of the sebaceous follicles imparting a rough appearance to the surface which on palpation resembles shark skin or sandpaper. In the early stages these small plugs reflect the light and have been likened to sulphur flakes. W. H. Wilson has demonstrated that by drawing a microscope slide over the surface of the nose the sulphur flakes powder away and leave no greasy smear as in the case of a non-pellagrin. These lesions appear first on the *ala nasii* spread over the nose the lips and when advanced, on to the forehead and chin eventually involving the whole face. The absence of natural oily sebum suggests that the condition is a deficiency type of asteatosis rather than seborrhoea. The term *dysebacia* is applied to this syndrome.

The second type of sebaceous gland change is associated with vitamin A deficiency and is known as phrynoderma, or toadskin. It is rarely seen on the face and is usually distributed over the shoulders and extremities. Rats maintained on a riboflavin-deficient diet developed sebaceous gland lesions and were cured with either synthetic riboflavin or autoclaved yeast. A further step was in the purification of the basic diet and vitamin B₁ was supplied as thiamin chloride and carbohydrate as sucrose. This diet is referred to as G-free diet 25 and is taken as a basic diet for future comparison lacking all the factors of the vitamin G (B₂) complex. When rats were placed on this diet they developed the same type and degree of sebaceous gland change as occurred on the riboflavin-deficient diet of Bourquin and Sherman. If the tail was removed at this time and the rat fed on autoclaved yeast (0.5 gm. per day) an immediate growth impulse occurred.

Not one of the synthetic factors when given singly to rats on a G-complex-deficient diet is sufficient to protect them from developing the sebaceous gland lesion described. If riboflavin is the only deficiency then synthetic riboflavin alone will protect but if all other factors of the G-complex are missing from the diet, pure riboflavin has little or no effect. Nor has vitamin B₂ alone in the absence of other G-complex factors any protective effect against sebaceous gland lesions.

In a statistical study of 512 pellagrins *dysebacia* was observed more frequently in adults than in children, in males than in females. The incidence is highest in negro males particularly in alcoholics with dementia. The outstanding histological change is hyperplasia of the sebaceous glands the follicles being dilated and plugged with dry sebaceous material. *Dysebacia* is readily cured by autoclaved yeast and crude extracts of liver. Vitamin B₂ and parenteral liver extract are ineffective. On the other hand, synthetic riboflavin has little effect in the active pellagrin who has not been treated with nicotinic acid.

It is concluded that *dysebacia* results from a deficiency of some factor or combination of factors present in the vitamin G-complex. Aetiologically the lesions of *dysebacia* appear to be quite like the

lesions produced in the rat although histologically they appear to be quite different the rat lesion being characterized by atrophy while in man there appears to be hypertrophy and hyperplasia.

P Manson Bahr

Hou (H C) **Riboflavin Deficiency among Chinese 2 Cheilosis and Seborrhoeic Dermatitis.**—*Chinese Med J* 1941 Apr Vol 59 No 4 pp 314-325 With 7 figs on 2 plates. [12 refs.]

In a previous communication the author pointed out that among the cases admitted to the eye clinic for ocular manifestations of ariboflavinosis only a few showed other signs of the syndrome as described by American writers such as angular stomatitis cheilosis and facial seborrhoeic dermatitis. Cheilosis has however been noted to be very common among the poor Chinese of Shanghai and widespread among the children in a refugee camp near by. It appears to be of common incidence also in typical cases of pellagra but then again is often dissociated from other signs of the syndrome. Among 10 pellagrins admitted to hospital cheilosis and glossitis were present in all facial seborrhoea in four and some ocular manifestation in five. In these patients while the dermatitis cleared up with nicotinic acid the cheilosis and seborrhoea showed but little improvement until yeast powder or riboflavin was given.

Of 186 refugee children examined 82 (44.1 per cent) exhibited cheilosis of these 82 however only nine showed any ocular manifestations seven children had ocular lesions but no cheilosis. Among the whole 186 children in none was the seborrhoeic affection of the face noted. These facts the author thinks suggest that the ocular lesions are due to an ariboflavinosis while cheilosis is due to an ariboflavinosis plus a minor deficiency of nicotinic acid. He finds also that the cheilosis and facial seborrhoea respond more slowly to treatment with riboflavin than the eye lesions.

H S S

SYDENSTRICKER (V P) **Clinical Manifestations of Ariboflavinosis.**—*Amer J Public Health* 1941 Apr Vol 31 No 4 pp 344-350 [38 refs.]

Riboflavin deficiency is characterized by photophobia dimness of vision at a distance cheilosis seborrhoeic lesions around the nose and ears and specific glossitis. The eye affections are important and instructive. The earliest and most constant feature is superficial vascularization of the cornea, which may progress to interstitial keratitis. It may even be that that form of keratitis which accompanies acne rosacea is also due to riboflavin deficiency. Therefore recognition of the early ocular signs of riboflavin deficiency offers a ready and easy method of identifying B Group avitaminosis at a stage when no other gross signs are present. The facial and labial lesions of ariboflavinosis largely contribute to the typical facies of pellagra, and together with the glossitis constitute the picture of *pellagra sine pellagra*.

Thiamin nicotinic acid and riboflavin are components of coenzymes essential to the intermediate metabolism of carbohydrate when any of the three vitamins is exhausted from failure of replacement or when there is a marked failure of balanced intake the clinical picture of avitaminosis becomes apparent. It has now become possible

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evidence of liver damage and it was found that the extent of the damage was proportional to the intensity of the various symptoms

C II

- i WILKINSON (P B) Human Black Tongue treated with Nicotinic Acid.—*Caduceus Hong Kong* 1940 May Vol. 19 No 2 pp 100-102
- ii MIDDLETON (W Malcolm) & MILROY (Gavin) A Case of Black-Tongue.—*Brit Dental J* 1941 Sept 1 Vol. 71 No 5 p 176

1. Human black tongue is an uncommon condition the main features of which are hypertrophy of the filiform papillae of the tongue with grey or black pigmentation. The onset is insidious it may persist for years and does not cause symptoms. The author records a case of a few weeks standing in which the patient a European woman in Hong Kong was otherwise perfectly healthy showing none of the signs of the pre-pellagrous state. Her diet had been well balanced. She was given 50 mgm nicotinic acid night and morning by the mouth and within 72 hours the tongue was almost clean.

The aetiology of the condition is not clear and the author states that so far as is known there is no connexion with canine black tongue. This being so and in the absence of symptoms of pellagra he is unable to account for the dramatic response to nicotinic acid, which he had not expected to produce any effect.

ii. In this case there was no enlargement of the filiform papillae but the patient had an abscess round a decayed molar tooth. There were several silver amalgam fillings in the mouth and as the black tongue cleared up after removal of the diseased molar the authors think that the black coloration may have been due to interaction between the silver and the septic discharges resulting possibly in a deposit of silver sulphide on the tongue. The question of avitaminosis is not mentioned in this case.

C IV

- NAGANNA (B) GIRI (K V) & VENKATESAM (P) Urinary Excretion of Nicotinic Acid in Pellagrins.—*Indian Med Gaz* 1941 Apr Vol. 76 No 4 pp 208-210 With 2 figs.

This is an article detailing a modification of the method introduced by HARRIS and RAYMOND (1939) for the quantitative estimation of nicotinic acid in the urine

All methods are based on the reaction in which the pyridine nucleus is broken down by cyanogen bromide and an aromatic amine with the formation of a yellow compound. The aromatic amine has varied in different methods, that used by HARRIS and RAYMOND being p-amino-acetophenone for estimating the intensity of the yellow colour the Pulfrich photometer was employed. The authors' adaptation of this technique consists in substituting an ordinary colorimeter for the photometer which is not to be found in every laboratory. The nicotinic acid values determined by this method were 4.8 to 6.1 mgm in the 24 hours for healthy adults taking an adequate diet compared with 3.0 to 5.0 mgm of Harris and Raymond. In pellagrins the amounts found varied from 0.0 to something under 3.0 mgm. normal values being found after successful treatment of the cases with nicotinic acid.

H S S

to correlate many observations on nutritional disease which have so far appeared contradictory. Ariboflavinosis is therefore, like pellagra and beriberi, a manifestation of B Group avitaminosis, and the specific signs probably result from complex disturbance of the coenzyme functions of the B vitamins as a group to which is added failure of activity of riboflavin in intracellular oxidation. P M B

STEDENSTRICKER (V P) The Clinical Manifestations of Nicotinic Acid and Riboflavin Deficiency (Pellagra).—*Ann Intern Med.* 1941 Mar Vol 14 No 9 pp 1499-1517 [40 refs.]

SPIES (Tom D) BEAN (William B) VILTER (Richard W) & HUFF (Nelson E.) Endemic Riboflavin Deficiency in Infants and Children.—*Amer J. Med Sci.* 1940 Nov Vol 200 No. 5 pp 697-701 With 2 figs (1 coloured) on 1 plate. [12 refs.] Summary appears also in *Bulletin of Hygiene*

Among 1 malnourished children in an area in Alabama in which deficiency diseases are endemic the lesions of riboflavin deficiency are most commonly seen. Out of 472 children, aged from 5 months to 14 years, of parents with deficiency diseases, 241 showed one or more of the prominent lesions, i.e. cheilosis, linear fissures of the lip and eye symptoms such as bulbar conjunctivitis and failing vision. All the children were underweight and apathetic. The disease waxed and waned but was most in evidence in the spring and summer. All responded rapidly to synthetic riboflavin by mouth. Often a striking increase in growth followed. Treatment of the mother with riboflavin or substitution of milk rich in riboflavin, resulted in the cure of the nursing infant. Bacteriological examination of the mouth and eye lesions showed *Staph aureus haemolyticus* in about 80 per cent. and *Strep faecalis* in about 20 per cent. of cases. *Corynebacterium xerosis* was isolated from a large percentage of the eye lesions and in pure culture from Biot spots in all 5 cases showing these spots. All the mothers had taken very inadequate diets during pregnancy and lactation. The children whether nursing or not, started the family food at about two months of age choosing the foods desired and usually selecting biscuits, corn bread, gravy and syrup. The majority of children received only 35 per cent. of the estimated requirements of riboflavin.

H V H Green

URABE (Kiyomi) Studien ueber Pellagra in Chōsen. IV. Mitteilung. Ueber den Magensaft und die Leberfunktion bei Pellagra. Gastric Juice and Liver Function in Pellagra.—*Japanese J. Dermat. & Urol.* 1940 Nov 20 Vol 43 No. 5 p 107

The author investigated 42 patients with pellagra. The liver function tests comprised tests for urobilin, urobilinogen, the combining power of camphor and glycuronic acid, the Takata reaction, the Azorubin S reaction and the Widal test. Most of the patients showed reduction in gastric acidity, only four being normal in this respect. In the other tests 14 gave normal results for urobilin, 14 for urobilinogen, 30 with the Takata reaction, 14 with the camphor test, 14 with the Azorubin S reaction and eight with the Widal test. The remainder showed various degrees of abnormality. A high proportion, therefore, showed

evidence of liver damage and it was found that the extent of the damage was proportional to the intensity of the various symptoms

C IV

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H S S

to correlate many observations on nutritional disease which have so far appeared contradictory. Ariboflavinosis is therefore, like pellagra and beriberi, a manifestation of B Group avitaminosis, and the specific signs probably result from complex disturbance of the coenzyme functions of the B vitamins as a group to which is added failure of activity of riboflavin in intracellular oxidation. P U B

SYDENSTRICKER (A. P.) The Clinical Manifestations of Nicotinic Acid and Riboflavin Deficiency (Pellagra).—*Ann Intern Med.* 1941 Mar Vol. 14 No. 9 pp 1409-1517 [40 refs.]

SPIES (Tom D.) BEAN (William B.) VILTER (Richard W.) & HUFF (Newlyn E.) Endemic Riboflavin Deficiency in Infants and Children.—*Amer J Med Sci* 1940 Nov Vol. 200, No. 5, pp 667-701 With 2 figs (1 coloured) on 1 plate. [12 refs.] Summary appears also in *Bulletin of Hygiene*.]

Amongst malnourished children in an area in Alabama in which deficiency diseases are endemic the lesions of riboflavin deficiency are most commonly seen. Out of 472 children, aged from 5 months to 14 years, of parents with deficiency diseases, 241 showed one or more of the prominent lesions—riboflavinosis, linear fissures of the lip and eye symptoms, such as bulbar conjunctivitis and failing vision. All the children were underweight and apathetic. The disease waxed and waned but was most in evidence in the spring and summer. All responded rapidly to synthetic riboflavin by mouth—often a striking increase in growth followed. Treatment of the mother with riboflavin or substances rich in riboflavin, resulted in the cure of the nursing infant. Bacteriological examination of the mouth and eye lesions showed *Staph aureus haemolyticus* in about 80 per cent. and *Strep faecalis* in about 20 per cent. of cases. *Corynebacterium xerosis* was isolated from a large percentage of the eye lesions and in pure culture from Bitot's spots in all 5 cases showing these spots. All the mother had taken very inadequate diets during pregnancy and lactation. The children whether nursing or not, started the family food at about two months of age, choosing the foods desired and usually selecting biscuits, corn bread, gravy and syrup. The majority of children received only 33 per cent. of the estimated requirements of riboflavin.

H. V. H. Green.

URABE (Kiyosi) Studien ueber Pellagra in Chō-en. IV. Mitteilung. Ueber den Magen und die Leberfunktion bei Pellagra. [Gastric Juice and Liver Function in Pellagra].—*Japanese J. Dermat. & Urol.* 1940 Nov 20 Vol 48 No. 5, p. 107

The author investigated 42 patients with pellagra—the liver function test comprised tests for urobilin, urobilinogen, the combining power of camphor and glycuronic acid—the Takata reaction, the Azorubin S reaction and the Widal test. Most of the patients showed reduction in gastric acidity, only four being normal in this respect. In the other test 14 gave normal results for urobilin, 14 for urobilinogen, 30 with the Takata reaction, 14 with the camphor test, 14 with the Azorubin S reaction and eight with the Widal test. The remainder showed various degrees of abnormality. A high proportion, therefore, showed

evidence of liver damage and it was found that the extent of the damage was proportional to the intensity of the various symptoms.
C W

- i WILKINSON (P B) Human Black Tongue treated with Nicotinic Acid.—*Caduceus Hong Kong* 1940 May Vol 19 No 2 pp 100-102.
- ii MIDDLETON (W Malcolm) & MILROY (Gavin) A Case of Black-Tongue.—*Brit Dental J* 1941 Sept 1 Vol 71 No 5 p 176

i Human black tongue is an uncommon condition the main features of which are hypertrophy of the filiform papillae of the tongue with grey or black pigmentation. The onset is insidious it may persist for years and does not cause symptoms. The author records a case of a few weeks standing in which the patient a European woman in Hong Kong was otherwise perfectly healthy showing none of the signs of the pre-pellagrous state. Her diet had been well balanced. She was given 50 mgm nicotinic acid night and morning by the mouth and within 72 hours the tongue was almost clean.

The aetiology of the condition is not clear and the author states that so far as is known there is no connexion with canine black tongue. This being so and in the absence of symptoms of pellagra he is unable to account for the dramatic response to nicotinic acid which he had not expected to produce any effect.

ii. In this case there was no enlargement of the filiform papillae but the patient had an abscess round a decayed molar tooth. There were several silver amalgam fillings in the mouth and as the black tongue cleared up after removal of the diseased molar the authors think that the black coloration may have been due to interaction between the silver and the septic discharges resulting possibly in a deposit of silver sulphide on the tongue. The question of avitaminosis is not mentioned in this case.
C IV

- NAGANNA (B) GIRI (K. V) & VENKATESAM (P) Urinary Excretion of Nicotinic Acid in Pellagra.—*Indian Med Gaz* 1941 Apr Vol 76 No 4 pp 208-210 With 2 figs.

This is an article detailing a modification of the method introduced by HARRIS and RAYMOND (1939) for the quantitative estimation of nicotinic acid in the urine.

All methods are based on the reaction in which the pyridine nucleus is broken down by cyanogen bromide and an aromatic amine with the formation of a yellow compound. The aromatic amine has varied in different methods that used by HARRIS and RAYMOND being p-amino-acetophenone for estimating the intensity of the yellow colour the Pulfrich photometer was employed. The authors adaptation of this technique consists in substituting an ordinary colorimeter for the photometer which is not to be found in every laboratory. The nicotinic acid values determined by this method were 4.8 to 6.1 mgm in the 24 hours for healthy adults taking an adequate diet compared with 3.0 to 5.0 mgm. of Harris and Raymond. In pellagras the amounts found varied from 0.0 to something under 3.0 mgm normal values being found after successful treatment of the cases with nicotinic acid.

keratitis, and in most the improvement was almost dramatic. The intravenous injections used were of ascorbic acid Roche a concentrated form of vitamin C in ampoules of 500 mgm per injection. Ascorbic acid appeared to be useless in the treatment of iritis.

Cataract—**SALIT**⁴ in a study of the records of 1,863 patients suffering from senile cataract who attended the eye clinic of the State University of Iowa during the past 29 years observed a periodical fluctuation in the number of admissions. A study of the meteorological statistics during these years showed that each rise in incidence of senile cataract immediately followed, or occurred during, a state-wide period of drought. Of the 1,863 patients 1 152 were men a fact which suggests that exposure to the weather may have been a factor.

GILLETTE⁵ has reported his treatment of 20 sufferers from senile cataract by the instillation into the conjunctival sac of a solution of thyroxin twice daily. None of the patients benefited by the treatment.

Retinitis pigmentosa—As a means of improving the circulation in the retina **Max Brown**⁶ has used retrobulbar injections of atropine sulphate in the treatment of retinitis pigmentosa. He injected 1 cc. of a 1 1000 solution of the drug twice a week. He states that out of six patients the disease was distinctly improved in two arrested in three and unaffected in one.

Lymphogranuloma inguinale—**MACNIE**⁷ has recorded three cases of uverts in the causation of which lymphogranuloma inguinale may have played a part. His paper furnishes a comprehensive review of the subject and he concludes that the virus of lymphogranuloma is one of the causes of Parinaud's syndrome and may be a cause of other ocular diseases particularly those of the uveal tract.

Rhinosporidium seberi—A case of rhinosporidial infection of the conjunctiva occurring in Texas has been reported by **ELLES**⁸. The patient was a boy aged 14 and the growth was attached to the upper tarsal conjunctiva. The polypus had the typical appearance—leaf like red and studded with small yellowish specks. The whole mass had the appearance of a liver pad. The growth was freely excised and there has been no recurrence in a period of two years. The author gives a full review of the literature and refers to two previous cases observed in the U.S.A. one in North Carolina and the other in Southern Texas.

H Kirkpatrick

⁴ **SALIT** (P. W.) Droughts as a Factor in the Development of Senile Cataract.—*Amer J Ophthalm* 1941 Mar Vol 24 No 3 PP 310-314

⁵ **GILLETTE** (David F.) Effect of Thyroxin on Incipient Senile Cataracts.—*Arch Ophthalm* 1941 Mar Vol 25 No 3 PP 424-44. [20 refs]

BROWN (W. Max) Treatment of Retinitis Pigmentosa with Retrobulbar Injections of Atropine Sulfate.—*Arch Ophthalm* 1941 May Vol 25 No 5 PP 519-526 With 6 charts

⁷ **MACNIE** (John P.) Ocular Lymphogranuloma Venereum.—*Arch Ophthalm* 1941 Feb Vol 25 No 2 PP 253-279 With 6 figs [34 refs]

⁸ **ELLES** (Norma B.) Rhinosporidium Seberi Infection in the Eye.—*Arch Ophthalm* 1941 June Vol 25 No 6 PP 992-991 With 6 figs (1 coloured) [48 refs]

MISCELLANEOUS

JOLLY (G. G.) Rural Medical Relief—*Indian Med. Gaz.* 1941 Mar Vol. 78 No 3 pp 177-180

[This paper is primarily concerned with India but it may be that the system proposed if successful there could be applied to other countries.] The author points out that although hospitals are usually situated in towns they cater for a considerable number of patients from rural areas but in spite of this the great mass of villages in India have grossly inadequate arrangements for medical relief. Rural medical relief can only be founded on resident medical practitioners but in view of the poor returns obtained and the lack of amenities in the villages it is not surprising that practitioners prefer to remain in towns. The solution appears to be Government subsidy to practitioners working in villages such a scheme is working successfully in Madras and has been started in the Punjab. Rural dispensaries constitute another problem they should act as cottage hospitals and should be so organized that they encourage the settlement of rural practitioners by acting as a link between them and the larger hospitals. These cottage hospitals should serve village groups acting as the counterparts in civil life of the casualty clearing stations of war. C IV

LEDGER (L. K.) & WASSOV (Tek Chand) Ages of Epiphyseal Union at Elbow and Wrist Joints amongst 238 Children in North West Frontier Province.—*Indian Med. Gaz.* 1941 Feb Vol. 76 No 2. pp 81-84

This work is a continuation of that done by LALL and TOWNSEND and reviewed in this *Bulletin* 1940 Vol. 37 p 384. The age records of 189 boys and 49 girls were checked and confirmed and X ray examination was then made on these subjects. The full results are set out in a series of tables which cannot be reproduced here and the authors admit that the series is small and that the margin of error must be high. There are great differences in the ages at which ossification of the same epiphyseal lines take place. So far as these results go however they indicate that epiphyseal union takes place earlier in India than in Europe and earlier in girls than in boys. The ages at which teeth erupt vary widely girls appear to get their wisdom teeth later than boys though the epiphyses unite earlier. By the age of 14 54 per cent. of the girls had started to menstruate by the age of 15 this had risen to 75 per cent.

An opinion as to age in adolescence cannot therefore be given with great accuracy and for medico-legal purposes there must be taken into account—the union of six epiphyses (radius upper and lower ulna lower humerus lateral and medial condyles base of the first metacarpal) the number of erupted teeth and the date of menstruation. Even then however a margin of about six months each way should be allowed. C II

BROUWER (D.) De bezinkingssnelheid der erythrocyten en haar beteekenis in de tropen [The Significance of the Blood Sedimentation Rate in the Tropics]—*Geneesk. Tijdschr. v. Nederl. Indië* 1940 Sept 10 Vol. 80 No. 37 pp 2184-2202. [21 refs.] English summary

After a discussion of the technique and the influence of the laboratory temperature on the sedimentation rate of the red blood corpuscles the author gives a short review about the theory of the sedimentation.

" At Batavia-C. working with a laboratory temperature of 25 deg C. he found as normal rates 4-11 mm. in the first hour in young healthy men, Europeans, Eurasians, Chinese as well as natives who lived under good health and food-conditions.

This is in correspondence with the researches on the proteins of the bloodplasma STREEF and STREEF SPAAN made in young healthy pupils of the medical school at Sourabaja mostly Chinese and natives.

They found protein levels corresponding with those from Europe.

In the tropics very often among the poor classes of the population a rather high increase of the sedimentation rate of the red blood corpuscles can be found. The causes are discussed *underfeeding beri-beri* and *ankylostomiasis*. Author found in a large number of patients a decrease of the sedimentation rate of the red blood corpuscles of 3 mm and therebelow in the first hour

He thinks there is a causal relation with a *more or less latent amoebiasis of the liver*

" Patients come with different complaints. From a clinical point of view one can divide them in different groups

A Asthenic complaints Fatigue not feeling fit and such like

B Indefinite stomach complaints.

C Pseudo-biliary colics

D Allergic symptoms (Asthma, migraine urticaria)

" With all these patients the liver was found enlarged. They all had in their clinical history or still had an amoebiasis of the intestines. The intestinal symptoms can be so slight that dysentery has never been complained of

Author thinks that the penetration of the amoebae in the liver causes a sort of toxic edema (hepatitis serosa) which causes an analogy with cases of icterus catarrhalis, a decreased sedimentation rate of the red blood corpuscles. All cases reacted well to emetine hydrochloride. In many patients the sedimentation rate could be followed for a longer period

In mild cases where the liver was sensitive on pressure but not enlarged the sediment rate after treatment with emetine injections became normal in about six weeks. When the liver was already enlarged, the sluggishness of sedimentation was less inclined to disappear and in most cases the course of emetine injections was repeated after six weeks

The sedimentation rate of the red blood corpuscles proved to be a valuable diagnostic help in tropical practice

[See also this *Bulletin* 1940 Vol. 37 p. 811]

FARNES (O. J.) *Coccidioidomycosis*.—*Jl Amer Med Assoc.* 1941 Apr 19 Vol 116 No. 16 pp 1749-1752 With 6 figs. [16 refs.]

Hitherto most of the cases of coccidioidomycosis have been reported from California—San Joaquin Valley fever is one of its synonyms—but the present article shows that it occurs outside that State the series described here having been reported from Arizona

The author gives a description of the fungus, *Coccidioides immitis* showing that it occurs in two forms or cycles one the parasitic, found in infected tissue the other the vegetative in culture and probably in nature. The former in infected tissue and sputum, appears as a spherule, 5-60 μ in diameter with refractile double-contoured capsule.

This form does not seem to be transmissible as infection from man to man or animal to man is not known to occur. The portal of entry is usually the respiratory passages rarely a traumatic cutaneous lesion and dissemination takes place by blood or lymph stream or by direct extension. Any organ may be affected most commonly the lungs skin bones lymph nodes and meninges. Its clinical manifestations are varied and its resemblance in some cases to tuberculosis is such that diagnosis can be made only by finding the characteristic spherules and confirming them by culture and animal inoculation. The same symptoms of chills cough blood stained sputum fever night-sweats loss of weight asthenia, malaise are common to both. An erythematous rash like erythema nodosum may be seen disappearing in 7-10 days. Death may occur in the acute infection or dissemination may give rise to a chronic progressive disease. A specific cutaneous reaction may be obtained with coccidioidin.

The author gives clinical details of five cases (1) a man of 67 with signs and symptoms of acute pneumonia (2) a man of 46 with the chronic progressive granuloma form (3) a boy of 15 with rapid cavitation and strong resemblance to tuberculosis (this patient died) (4) another lad of 15 with the febrile broncho-pneumonic San Joaquin Valley fever form (5) a woman of 23 with a very acute form following full term parturition death occurred 19 days after onset of the illness with symptoms like those of acute miliary tuberculosis [see this *Bulletin* 1938 Vol. 35 p 459 1939 Vol. 36 pp 101 507 508 1940 Vol. 37 p 882] H H S

KESSLER (John F) Recent Observations on *Coccidioides* Infection.—
Amer J Trop Med 1941 May Vol. 21 No 3 pp 447-453
[15 refs]

An excellent account of the subject largely from the epidemiological aspect. Between 1893 and 1939 there were 660 cases of coccidioides granuloma reported to the California State Department of Public Health. The following table shows the rapid increase in more recent years —

Coccidioidal Granuloma in California

1893-1899	4
1900-1904	7
1905-1909	9
1910-1914	17
1915-1919	23
1920-1924	50
1925-1929	123
1930-1934	163
1935-1939	264
Total	660

Most of these originated in the southern part of the San Joaquin Valley and of 100 patients admitted to the Los Angeles County Hospital 51 acquired the infection in San Joaquin Valley 31 in California south of Tehachapi eight in Arizona New Mexico or Texas 10 were not determined.

The chlamydo-spores are in the dust and the commonest portal of entry is the respiratory tract by inhalation of the spore-laden dust

in some 70 per cent. the initial lesion is in the lung. Next commonest is an abraded site on the skin. A typical instance of this is described. A man went hunting near Lake Elsinore Riverside County. His leg was abraded by the top of his boot and the lesion failed to heal. He ran a temperature indicative of sepsis, blood culture yielded *Coccidioides immitis*, and the lungs showed slight involvement. He died in a fortnight from milary coccidioidosis.

The chronic granulomatous form may involve any organ and the death rate is 50-60 per cent. Pulmonary disease is most common. Generalization occurred in 16 of 50 cases studied. With generalization meningitis is usual and death soon ends the scene.

Other patients suffer from respiratory symptoms commonly diagnosed as a cold, or influenza, or bronchopneumonia, and recovery is usually fairly prompt. In about 5 per cent a rash like that of erythema nodosum is seen. the death rate is under 1 per cent. These infections are termed San Joaquin Valley fever, Desert fever or Desert rheumatism. The coccidioidin test with a preparation made of a mixture of several strains appears to be very specific and recovered cases have been known to react as long as nine years after the initial infection.

H H S

FOLEY (Maunce P) LOVE (J Grafton) BRODERS (Albert C) & HEIL MAX (Fordyce R) Coccidioidal Granuloma. Report of Case Originating in Texas.—*Western Jl Surgery Obstet & Gynecol* 1940 Dec Vol 48 No 12 pp 738-741 With 5 figs. [15 refs.]

Coccidioidal granuloma can no longer be regarded as a rarity. More than 450 cases have now been reported from California. Most have developed in San Joaquin Valley but it would be wrong to infer that it is not found elsewhere. It is probable also that deaths occur from it, the condition having been diagnosed as tuberculosis.

The authors record a case in an office worker 33 years of age from north-western Texas. He complained of fever, chronic cough, night sweats, fatigue, headache, transient blurring of vision and a discharging sinus behind the right ear. He had been ill for about 10 years on and off (since 1927) and had lost 43 lb. in weight. Two years ago there developed two small tender swellings the size of a pea, over the right occipital region. Aspiration the following year yielded material containing spore-like bodies, and culture a fungus-like growth, thought to be a streptothrix.

Examination in 1937 showed leucocytosis of 11,100 per cmm. of blood, W.R. negative, no tubercle bacilli in the sputum. X-ray showed three destructive lesions of the occipital bone, and lesions in the lungs simulating active tuberculosis. Operation revealed a mass of shiny granular tissue pearly in appearance extending through the skull and over the dura. It was carefully scraped off and the site swabbed with Tr. iod. Convalescence was rapid. Cultivation and animal inoculation confirmed *Coccidioides immitis* as the cause.

The authors describe the organism and its lesions in the following words:—

"*Coccidioides immitis*, a doubly contoured organism frequently filled with spores, usually gains entrance to the body by way of the skin or lungs. It attacks the skin, lungs, lymph nodes, bones and so forth, with an avidity comparable with that of *Mycobacterium tuberculosis*. It produces nodules, ulcers, tubercles and abscesses and presents a macroscopic

picture for the most part comparable with that of tuberculosis. With the formation of tubercles consisting of epithelioid cells, foreign body giant cells and necrosis, the microscopic picture is even more like tuberculosis than the macroscopic—and if one did not find the double contoured organisms often containing spores, one would be justified in making a diagnosis of tuberculosis.

In its growth it presents two phases—a round unicellular body with refractile double contoured border and containing endospores—this form is seen in animal inoculations. The other shows branched, septate mycelia, without conidia, this is seen in cultures on artificial media. [See this *Bulletin* 1937 Vol 34 pp 177-510 1938 Vol 35 p 459 1939 Vol 36 pp 507-508 1940 Vol 37 p 882 1941 Vol 38 p 84]

H H S

NIÑO (Flavio L.) PONS (Luis M.) & GAY (Antonio E.) Granuloma paracoccidioidico de localización laríngea. (Estudio clínico y micológico) [*Laryngeal Paracoccidioides Granuloma.*].—*Boletín Clín Quirúrg* Buenos Aires 1941 Jan Vol 16 No 138 pp 47-65 With 16 figs

The patient was an Italian 30 years old who had had a cold for four months—a sense of heat in the nasal mucosa—and for 2-3 weeks some difficulty and pain on swallowing—there was no fever. On the left side of the neck were small hard painless lumps the size of peas and a gland as large as a filbert. The uvula was oedematous and at the base on the left side there was a small ulcer 5 mm. in diameter and behind it another 1.5 cm. in diameter with yellowish white slough and swollen edges. The left side of the epiglottis was oedematous and ulcerated and these conditions extended to the larynx.

He was given radium treatment with iodide internally up to 6 gm. daily. The ulcerations improved and the general condition remained good. By growth from the expectoration and by animal inoculation of fragments taken for biopsy *Paracoccidioides brasiliensis* var *cerebriformis* was proved. This strain at all events has not proved very virulent, as the condition has now been present for two years since symptoms appeared and the patient's health remains generally good.

H H S

DORMER (B. A.) & FRIEDLANDER (J.) Case Report from the Clinical Department of King George V Jubilee Hospital for Tuberculosis, Durban.—*Brit J Tuberculosis* 1941 Apr Vol 35 No 2 pp 114-115 With 3 figs on 2 plates.

Unfortunately the case here reported could not be followed to its conclusion but is worth notice because of its resemblance to one of infection by *Coccidioides immitis* and of which it may possibly have been an example.

A native woman of 33 years of age developed a dry non-productive cough which after a month became looser with increasing mucopurulent sputum. She had no night-sweats but on one occasion a slight haemoptysis. There was progressive dyspnoea. When she came under the authors' observation there was marked orthopnoea cough, profuse mucopurulent nummular sputum no adenitis, no noticeable emaciation. The physical signs were those of fairly advanced bilateral pulmonary tuberculosis. No *Mycobacterium tuberculosis* could be seen—moulds and secondary organisms grew on culture and round bodies were

unable to classify. He called it also pseudo-leprosy [the reason of this is obscure]. It is an elephantiasis condition of the feet, occurs in either sex usually begins in childhood as an erythema of the instep with adenitis, some fever and malaise. After 4-5 days the redness subsides leaving some oedema. recurrences take place at varying but usually progressively shorter intervals till the whole foot (in time both feet) is swollen and papillomata develop on the dorsum and digits. Local infection among a people going about barefoot is likely but no parasites or causative bacteria have been found, and heredity does not seem to play a part [see this *Bulletin* 1928 Vol 25 p 703]

H H S

SIMONS (R D G Ph) Apenpokken en roode hond [Pemphigus Contagiosus and Prickly Heat].—*Geneesk Tijdschr v Nederl Indië* 1941 Jan. 13 Vol 81 No 2 pp 59-88 With 4 figs. on 1 plate & 1 folding plate [15 refs.] English summary

Detailed review of the monkey-pocks (the name of pyosis mansonii or pemphigus contagiosus in the Netherlands East Indies) and prickly heat. *Staphylococcus bullosa superficialis non follicularis disseminata* endemica (epidemica) tropica and mularians *erythematopapulosa tropica*.

European and Indo-European people are more prone to both diseases than native people who are very rarely affected.¹

Because the staphylococci prefer the folliculae sweat and sebaceous glands it is of importance to note that this is not the case with pemphigus contagiosus. The bullae are localised *inter follicularly*.² The pustule formation only occupies the epidermis. The bullae do not leave scars. The not-itching disease is contagious. Should no general hygienic measures be taken the disease continues to exist in the hospital.

Pemphigus contagiosus tropicus and pemphigus neonatorum are identical.³ Pyosis Corletti and pyosis Mansonii are probably the same as these monkey-pocks.

Prickly heat is very often mistaken for seborrhoic eczema. The name lichen tropicus is wrong or will not meet the case. The cause is obstructed perspiration, or better the obstructed evaporation of sweat in climates with a high percentage of moisture of the air. The skin is irritated by perspiration (also by alteration of the pH) and infected. Microscopically there is a non-humid eczema plus a pyoderma. Should the prickly heat become humid one may assume that there has been an irritation by medicaments e.g. soaps. The region of the eccrine sweat glands is specially affected. Greasy ointments are not to be recommended for both diseases. The disinfection treatment of the monkey-pocks is very useful and of diagnostic value.⁴ This treatment consists of frequent bathing disinfection of the clothes and should be continued to prevent relapses. For prickly heat lotions are preferable to soaps which sometimes may provoke the prickly heat or irritate the (eczematous) skin. In the tropics after every bathing dusting powders should be freely applied to the normal skin and skin affected by prickly heat. By this *radiator* treatment the (perspiration) surface of the skin is enlarged and all moisture is absorbed. All additional causes (e.g. alcoholic drinks, hot fluids and food warm clothing, elastic parts of the clothes soft sleeping mattresses) of perspiration must be avoided.

¹ ² ³ and ⁴ are the characteristic peculiarities of pemphigus contagiosus

HOWELL (D E) & STILES (George W) An Unusual Reaction to the Bite of the Dove Louse Fly, *Stilbometopa podopostyla* Spelzer.—*Jl Amer Med Assoc* 1941 Apr 5 Vol. 118 No 14 pp 1517-1518

There are few records of man being bitten by hippoboscids flies and in general the effects of the bites are slight. The patient here recorded was bitten in the region of the submaxillary gland by the dove lousefly *Stilbometopa podopostyla* the fly being captured and identified. The bite was not painful but 2½ hours afterwards the patient suddenly found her vision blurred and lost the use of her arms and legs. vertigo was extreme and her head ached severely. There was slight local swelling and considerable tenderness of the gland. the temperature was 97.5°F the pulse 100. Fleeting pains were felt in the joints with abdominal soreness increased respiration tremors and chilly sensations. there was no vomiting. Opiates were given but the symptoms persisted for 28 hours. complete recovery took place within a few days.

Stilbometopa podopostyla is commonly a parasite of doves and has not previously been known to bite man. it cannot live away from its host for more than a few days and presumably in this instance there were doves near the house though none had been seen. C IV

GALLIARD (Henri) & DAMO-VAN NGU Une espèce nouvelle d'*Anophèles* du Tonkin, *A. tonkinensis* sp. nov. [*A. tonkinensis* a New Species from Tonking].—*Rev Méd Française d'Extrême-Orient* 1940 Nov-Dec No 9-10 pp 595-598. With 3 figs.

TOUMANOFF (C) Contribution à la connaissance des Ixodidés de l'Indochine du genre *Harmaphysalis* Koch. C L. Description de trois espèces nouvelles. [*Haemaphysalis* Ticks in Indo-China. Three New Species.].—*Rev Méd Française d'Extrême-Orient* 1940 Oct No 8 pp 463-490. With 17 figs.

JIROVEC (Otto) & RODOVÁ (Helena) Ueber die Züchtung der Trichomonaden. [Trichomonad Culture].—*Zent f Bakt* 1 Abt. Orig 1940 Apr 2, Vol. 145 No 6 pp 351-360 [23 refs.]

After considerable experimentation the authors have devised a medium for the growth of trichomonads which is not only simpler than others but better in its reliability. It is prepared as follows — 5 cc. of human or horse serum which need not be sterile is diluted with 95 cc. of a buffered modification of Ringer's solution (distilled water 1 000 NaCl 6 CaCl₂ 0.1 MgSO₄ 0.1 KH₂PO₄ 3 n/l NaOH 18-22 to a pH of 7.4). The diluted serum is distributed in test tubes 4-6 cc. in each and the tubes are then sterilized on two or three successive days in the steam sterilizer. The tubes which can be kept indefinitely in the ice chest are then ready for use. In place of the Ringer's solution 0.6 per cent sodium chloride solution may be used for diluting the serum. In this case the required pH of 7.0-7.4 is obtained by the use of n/50 HCl or n/50 NaOH as the case may be. In this medium a number of human trichomonad strains from the mouth vagina and intestine and others from the rat pigeon and frog have been successfully cultivated, the intestinal ones at room temperature the others at 37°C. The maximum growth occurs on the fourth or fifth day and subculture

away the regular and monotonous life the fresh and moist climate the restricted diet the monotony of the diet and the composition of the latter which consists of fresh natural products only. It may be sufficient to state that a mode of living like that on Tristan (or by preference a little more luxurious) seems to have a favourable influence on the health.

The above is a brief summary of this fascinating study and of the views of those who have made it. Isolation, monotony, hardship even to the verge of starvation, these are strange factors to be associated with good health and well being. Of late years we have heard more often about under-nutrition and the need for a higher standard of living. We did not know that we were undernourished but we are told that we are. We did not realize that a rise in the standard of living, with which we had been content would benefit us. This refreshing paper sheds a ray of light and hope through the gloom of disillusion and discontent which has been cast over us. That a degree of hardship is a good and sound medicine no one can doubt. Our forebears survived on it—a bag of meal or a dish of brose—and they left a hardy race behind them. Perhaps they were not so misguided after all. Richer diet, comfort and ease are dangerous expedients as the Romans found to their cost. “*Per aspera ad astra*.” The little island of Tristan da Cunha has told its story. We would do well to pause and to re-examine the standards which we have set up. Even our enemies must admit that we are a hardy race and we must see to it that we remain so.

A. G. McEnderick

WELCH (Janet) [M.B.E. M.B. B.S. (London) M.R.C.S. L.R.C.P. (England) D.T.M. & H. (England) Medical Officer Church of Scotland Hospital Blantyre, Nyasaland] Nursing Education related to the Cultural Background in East and Southeast African Colonies.—87 mimeographed pp. 1941 New York The Carnegie Corporation

The author of this interesting and valuable report has been engaged for 12 years in medical practice in Kenya and Nyasaland, and recently by means of a grant from the Carnegie Corporation has made a special study of modern developments in nursing education, organization and practice, and has visited nursing institutions in Canada, the U.S.A. and Porto Rico.

Modern developments in nursing education in many parts of the world are described, and extracts from numerous reports quoted. One extract from the 1937 report of the International Health Division of the Rockefeller Foundation sums up the position. The Foundation seeks to further certain modern principles of nursing education, namely, that the responsibility of a school of nursing should be the education of nurses on a professional level, that the School should have its own budget separate from other budgets of the institution with which it is connected, that nursing education should have a broad cultural, social, and scientific basis, that public health nursing should be taught throughout the nursing course and that it is as important to provide good field practice in public health nursing for the students as it is to teach good bedside nursing care in a hospital.

Part I of the report under review describes the lack of nursing services in East Africa to-day and the difficulties associated with their development, one of the chief of which is the inadequate education of women

and girls. There follows a section on the type of nursing service which is considered necessary. It is felt that the great need in African society is for instruction in preventive medicine that the best means of giving this instruction is by means of public health or community nurses and that in planning a curriculum for nursing education the preventive and social aspects of the subject should therefore be stressed throughout the whole course.

The English system of training public health nurses that is hospital training followed by post-graduate public health training is not considered suitable for Africa.

Part II deals with the system of nursing education which is thought suitable for East and South East Africa and a curriculum is drawn up for training girls who have had a primary school education. It is considered that the nursing schools should be organized as educational institutions and not as service departments to hospitals and that there should be full time instructors who would also give bedside instruction in the wards. It is recommended that all European nurses and not only instructors should have preparatory courses in London to equip them to meet the special problems of the African social background.

The author states. The solution of the problem appears to be along the following lines—(a) The nursing school must be an educational institute for the undergraduate nurse throughout her course. (b) The hospital must be the portal to a planned continued educational process for the student throughout her course. (c) The hospital must supply its nursing staff to cover the nursing requirements of all its patients and not be dependent on student service from the school although this African staff would not be highly trained until graduates under the new educational system were available to take their place. (d) Provision must be made for training and employment of such workers as nurse-aids and ward-maids to relieve qualified African staff of non nursing duties throughout the hospital.

It is suggested that there should be a nursing school in each Colony with its own Administrative Committee and that there should also be a Central Advisory Council to co-ordinate the work throughout all the East and South East African Colonies. Co-operation between Education and Health Departments both in nursing education and in giving health instruction to the people is urged.

The report should prove very helpful to all those who are concerned in building up nursing services in the colonies and the development of an experimental nursing school in keeping with modern ideas of nursing education on the lines suggested by the author should be considered.

M G Blacklock.

EDWARDS (F W) [M.A. Sc.D. F.R.S. etc.] *Mosquitoes of the Ethiopian Region. III—Culicine Adults and Pupae.*—pp viii+499. With 4 coloured plates & 184 figs. 1941. London. Printed by Order of the Trustees of the British Museum. [£1 10s.]

This volume which deals with the adult Culicine mosquitoes and their pupae completes the monograph of the mosquitoes of the Ethiopian Region that is the whole continent of Africa south of the Sahara. Part I by G H E. HOPKINS [this *Bulletin* 1936 Vol. 33 p. 570] covered the larvae of the Culicines and Part II by

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 Huff, C. G., 413 (Mal.)
 — with Kitchen & Roe (36) (Mal.)
 Huff N. E. with Spies, Bean & Vilter 720 (Pel.)
 Hughes, L. 18 (Sp.)
 Hughes, W., (17) (Sp.)
 Hummel, H. G. 272 (Am.)
 Humphreys F. A. with Gibbons, 326 (Pl.)
 Hutton E. L. 333 (Mal.)

 L
 Idnani J. A. with Ray 453 (Fev)
 Igarashi, M. & Hayashi F. 463 (Lep)
 Ignacio Chala, J. (221) (Lep.)
 d'Ignazio, C. & Del Campo G. 54 (1 & S.)
 — Lombardi, A. & d'Arcangelo D. 200 (Fev)
 Imbert M., with Sabadini, 39 (Hel.)

- Maltaner E 463 (Lep)
 Mamlang, J 668 (Lep)
 Manchanda, S. S. with Taylor 184 (Misc.)
 Manson-Bahr P 7 326 (Sp) 333 (Mal) 516 (Hel), 415 529 (Misc.)
 — & Walton, J 34. (Hel)
 Maxwell, R D 313 (Mal)
 — with Coulston, 51* (Mal)
 — Counts, E & Coulston, F 651 (Mal)
 Maplesstone P A. & Bhadrin, N. V 374 (Hel)
 — & Makery, A K 114 (Hel)
 — with Panja, 85 (Der)
 — with Rao, 132 (Hel)
 Mapother P with Moore (83) (Der)
 Mara, L. with Dumbulla & Carapen, 706 (Mal)
 Marberg, K. with Reutler 250 (Dys)
 Marchionnis, A 263 (Lesh)
 Mariani, G, 199 (Fev)
 Marston, D F with Mateer Baltr & Hofflands, 270 (Am)
 Markoff, N 301 (Sp)
 Marshall, E K Jr Bratton C Edwards, L B & Walker E 597 (Dys)
 — White H J & Lit Hfeld, J T Jr 598 (Dys)
 Martin, J T & Hester K H C 337 (Misc)
 Martins A P 239 (Lesh)
 Martins, A V 4 (Hel) 639 (Tryp)
 — & Tappinmba, V 639 (Tryp)
 Maru, A M 542 (Misc)
 Mason, E D 423 (Misc)
 Mason, J H & Alexander R A 203 bus (Fev)
 — with Alexander 203 (Fev)
 — with — & Vetz, 203 (Fev)
 Masunaga, E with Badger & Wolf 29 (Lep)
 Mateer J G Baltr J I Marston D F & Hofflands, R A 270 (Am)
 Mathews, G B with Tchong 450 (Fev)
 Matuda, S 517 (Hel)
 Maue, C A 528 bus (Hel)
 Massé J with Berni 4 (Lep)
 May A J 685 (Fev)
 Mayer M & Pifano F 640 (Tryp)
 Mazza, S 251 (Lesh) 315 (Tryp)
 — Basso G & Basso R 318 (Tryp)
 — — & Conte D 317 (Tryp)
 — & Corrojo A 577 (Lesh)
 — & Freire R S 316 bus (Tryp)
 — & Jorg, M E 318 (Tryp)
 — & Miyara S 317 (641) (Tryp)
 — — Basso G & Basso R (640) (Tryp)
 — & Urcelay G 316 (Tryp)
 Mazza, S & others 319 (640) (641) (Tryp)
 Maresmar D C with Roy & Mukhorjee, 421 (Misc)
 Maszotta, L, 81 (Tryp) 731 (Misc)
 — with Osomo, 525 (Hel)
 de Medon, B 183 (Misc)
 Meinardi-Flaumenhaft, T 537 (Misc)
 Miera, J A, 378 (Hel)
 — & Amara, A D F 375 (Hel)
 Mielewsky H E, 335 (Misc) 661 (Fev)
 — with Snyder 889 (Am)
 Mello, G. B, 571 (Lesh)
 Menon, K P with Shortt, 338 bus (Mal)
 — with — & Iyer 413 (Mal)
 Menon, M. A. U., (153) (Hel)
 Menon, T B & Ramamurti, B., 810 (H)
 Mer G Bernbaum, D & Klagler L J (Mal)
 Mertens, W. H. & Beawkes, H, 215 (Cl)
 Mettler S. R., with Boell, 635 (Eu)
 Metlengracht, E., with Bachel, 408 (Fel)
 Meyer K. F (630) (Pl)
 Meyers, F M 60* (Bb.)
 Middleton, W M & Mihroy G 7*1 (Pal)
 Miller M J & Choquette L 825 (Hel)
 — — Audet, W Helso, R F Goquette, J A 528 (Hel)
 Mills, M A with Mackas, 390 (Sp)
 Milner J G, 347 (Oph)
 Mihroy G with Middleton, 721 (Pal)
 Mitra S L, 215 (Chi) 251 (Lesh)
 Miyara, S with Mazza, 317 (641) (Tryp)
 — with — Basso G & Basso R, (640) (Tryp)
 Mochtar A with Esserfeld & Colber 99 (B.I)
 Mohamed, A S 40 bus (Hel)
 Mohan B V with Mulligan & Russell, 6 (Mal)
 Mohr C F with Eagle Hogan & Black, 70 (Lep)
 Mohr W & Luppelt, H 518 (Hel)
 Moses, R 709 (Mal)
 Mower B 704 (Lep)
 Moll, A A & O'Leary S B 321 625 (H)
 Monacoli, M & Pham, D 57 (V & S)
 Mondal, R S 564 (Mal)
 Monner A 441 (Fev)
 — with Castaneda & Silva, 445 (Fev)
 Moog V 51 (Mal)
 Moore M 535 (Misc)
 — & Mapother P., (93) (Der)
 Morean P 38 (Hel)
 Moreira, J A with de Magalhães, 443 (Fev)
 Moreno, A with Corbello & Vela, 442 (Fev)
 Morgan, E 180 (Mal)
 Morozkin, N I 440 (Fev)
 — with Grossachewski, 441 (Fev)
 Morrill, C C with Graham & Boley 160 (Rab)
 Morrison, S H & Parsons, L, 479 (R.F.)
 Mosley V with Callaway 83 (Der)
 Most H 174 (Mal)
 — & Joliffe, N 175 (Mal)
 — & Trumberry, M H 644 (Mal)
 Motta, J & Costa, H de M 699 (Lep)
 Mortonelle L (423) 843 (Misc)
 Moyers, F W with Bonne, 112 (Hel)
 Mueller J F 460 (Hel)
 Muir E 223 bus, 706 (Lep)
 — with Rogers & Cook, 20 (Lep)
 Mukerji, A K with Mephistoma, 114 (Hel)
 Mukherjee, D N with Tribedi, 92 (Der)
 Mukherjee, P with Roy & Maresmar 421 (Misc)
 Mukherji, S P with Lal, Das Gupta & Chatterji, 253 (Dart.)
 Mulligan, H W & Russell, P F., 338 (Mal)
 — & Mohan, B. V 646 (Mal)
 — Soumerville T & Swarnmath, C. I 647 648 bus (Mal)
 — & Swarnmath, C S., 650 (Mal)
 Monk, F., (201) (Fev)
 Mordock, J R., 627 (Pl)

N

- Naganna, B., Guri, H. V & Venkatesam P 721 (Pel.)
 Naidu, S R 273 (Dys)
 Nair P K., with Karunakaran 286 (Bb)
 Najjar V A. & Hott L. E. Jr 400 (Pel.)
 Nakamura, T (188) (Vms.)
 Nakasato, T with Yoshino, 39 (Hel.)
 Nandi B K. 645 (Mal.)
 Napier L E (17) (Sp.) 183 (Misc) 333 (Mal.) 437 (Y F)
 — & Das Gupta, C. R. 182 (Misc.)
 — — & Rao S. S 521 (Hel.)
 — & Sen, G N 574 (Leish.)
 — with Sen Gupta, 289 (Dist)
 Narayan, J 712 (Mal.)
 Narayana, P A. with White 581 (Mal.)
 Nargund, K. S with Vyas & Bokil, 378 (Hel.)
 Nature 272 (Am)
 Nauck, E G with Gerns, 119 (Misc.)
 — & Zumpt, F 443 (Fev)
 Navarro R J 348 (Misc.)
 — & Gomes F 54 (Y & S)
 — with Garcia & Bautista, 43 (Hel.)
 de Navasquez, S 340 (H)
 Neghme A. with Dessert & Faiguenbaum 83 (Tryp)
 Negroni, P 554 (Misc)
 — & Tey J A 92 (Der)
 Neilson W P 98 (R.F.)
 Neits, W D with Alexander & Mason, 203 (Fev)
 Nelson, E. C 278 (Dys.)
 Nelson, K. R. with Hornsbrook, 891 (Fev)
 Nguyen-van Minh with Condu & Grenier 23 (Lep)
 Nicholas, M. J with Greval 185 487 (Rab)
 Nicholls, L 206 (Fev)
 Nicolson, E. L (517) (Hel)
 Nielson M. with Robinson, Dill & Wilson 671 (Misc)
 Nieto Roa D with Varela, 88 (Der)
 Nigeria, 631 (Tryp)
 Nido F L. Pons, L. M. & Gay A. E 729 (Misc)
 — & Rivas, C. I 237 (Misc)
 Nitto S., with Ota, 461 462 (Lep)
 Nitescu, I. I & Stan Sacnu M 661 (Vms)
 Niven, J C. with Field, 107 (Mal)
 Nolan, J O 25 220 (Lep.)
 Nodaka, N., 224 (Lep.)
 Nozclotti, L 107 (Mal.)
 Nutter P B Rodaniche E C & Palmer W L., 585 (Am.)

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- Oag, R. h. 80 (Tryp) 87 (R.F.)
 Oberdorffler M. 26 (Lep)
 — & Gehr E. 22 (Lep)
 Oberdorffler M. J & Collier D R. 220 (Lep)
 de Ocampo, G & Cruz J N 803 (Bh.)
 Ochoa, R. R. with Silva, 632 (Fev)
 Ochoa-Palacios, M. with Gabaldon & Antonio Lopez, 581 (Mal.)
 — with — & Perez Vivas 562 (Mal.)

- O'Connor K. J 184 (Misc.)
 Oeding, P with Henriksen 734 (B.R.)
 O'Farrell P T McGrath & Boland 274 (Dys.)
 Ogutsova A. b 642 (Mal)
 Ohama, S 474 (Hel.)
 Okah E., 348 (Oph.)
 O'Leary S B with Moll, 321 625 (Pl.)
 Ohtsky P K. (454) (Fev)
 Oliver-Gonzalez, J 528 (Hel.)
 Oliver L. with Cort McMullen & Brackett, 44 378 (Hel)
 Oomen, H A. P C. 53 (Y & S.)
 Ormsby O S (401) (Pel.)
 Orquiza C T with Chiknamco 517 (Hel.)
 Orsini, O 578 (Leish.)
 Osorio M T & Marzotti, L 525 (Hel.)
 O'Sullivan J F 384 (Sp.)
 Ota, M. & Nitto S 461 462 (Lep)
 Otten L. 330 (Pl.)
 Otton, G F with Brown 476 (Hel.)
 — with Cort 476 (Hel)
 — Hewitt, R. & Strahan, D E 473 (Hel.)
 Otto, H 278 (Dys.)
 Otto R. & Wohlrab R. 207 (Fev)
 Ou T 507 (Mal)
 Ouyang, G 277 (Dys.)
 Overbeek, J G (361) (Mal.)

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- Packebanian, A 81 bis 637 (Tryp)
 Pakati, A. P 104 (Mal.)
 Pai, H. C & Hu C. H 571 (Leish.)
 Paige, B H with Wolf & Cowen, 354 bis (Misc.)
 Pakenham Walsh, R. & Rennie A. T 231 (Mal)
 Palawandow G 495 (Rab)
 Palestine 164 497 (Rab)
 Palit C C., Basu S N & Varma, V L 606 (Dist.)
 Pallister R. A. (287) (Bb)
 Palmer P F 494 (Rab)
 Palmer W L., with Nutter & Rodaniche, 585 (Am)
 Pampana E. & Castri, G., 710 (Mal.)
 Pandit, C G., with Anderson Sanjiva Rao & Shortt, 434 (Fev)
 Pang K. H Liu P Y & Zia, S H., 207 (Fev)
 Panja, D & Mapionstone, P A., 85 (Der)
 Panja G with Paracha, 620 (Pl.)
 — with — & Paul, 580 (Chl.)
 Pannekoek Wentenburg, S. J E. & van Veen, A. G., 602 (Bb)
 Panneton, P 723 (Oph)
 Pansini, G Caccuri S., Coppa E. & Parise, N., 33 (Mal)
 Paracene, L & Chagas A. W 572 (Leish.)
 Pardal E. 625 (Pl.)
 Pardo-Castello V 49 (Y & S.) 89 (Der)
 Parise N with Pansini, Caccuri & Coppa 23 (Mal)
 Parker R. R 683 (Fev)
 Parker V. with Faust, 173 (Mal.)
 Parsonnet, A. E. & Bernstein, A. 661 (Vms)
 Parsons L. with Morrison 479 (R.F.)

- Paschke, C. L. & Lal, S. 13 (Sp)
 — & Mahik, K. S. 583 (Chi)
 — with Mahik, 583 (Chi)
 — & Lal, S., 606 (Diet)
 — & Panja, O. 629 (PL)
 — & Paul, B. M., 580 (CBL)
 Passmore, R. & Sommerville, T. 646 (Mal)
 Patino Camargo, L., 209 693 (Fev) 351 (Misc.)
 Patrick, D. W., with Badger Fris & Wolfe, 22 (Lep)
 Patterson, T. C., 531 (Misc)
 Patwardhan, N. G. with Pradhan, 659 (Vms)
 Patwardhan, V. N., with Chitre, 390 (Sp)
 Paul, B. M., with Paschke & Panja, 580 (Chi)
 Paul, J. H., with Southburn & Mahaffy 416 (Misc.)
 Paulraj, M. with Cochrane & Salmood, 27 (Lep)
 Payne, G. C. & Payne F. K. 477 (Hel)
 Pearson, A. S. 693 (Fev)
 Peña Chavarria, A. & Rumba H. W. 351 (Misc.)
 Penny M. 119 (Hel)
 Penna, R., with de Magalhães, 444 (Fev)
 Pereira, A. with Vaz, 657 (Vms)
 Pereira, C. 638 (Tryp)
 Perez-Vivaa, M. A. with Gabaldon & Ochoa-Palacios, 562 (Mal)
 Pers, S. 663 (Vms.)
 Perrin, T. L., with Lillie & Armstrong, 446 (Fev)
 Pessa, H., 24 (Lep)
 Pessôa, S. B. & Pessôa, B. R., 264 *lus* (Lesh)
 — with Pestana, 264 (Lesh)
 — with — & Corrêa, 264 (Lesh)
 Pestana, B. R. & Pessôa, S. B. 264 (Lesh)
 — with Pessôa, 264 *lus* (Lesh)
 — & Corrêa, A. 264 (Lesh)
 Phao-Huy-Quat, with Gailbird & Dang-Van-Nga, 43 (Hel)
 Philip C. B. 443 (Fev)
 Phillips, G. L. C. with Veeraraghavan, 159 (Rab)
 Pimahr, M. 167 (Vms)
 Pickets, E. G. & Bauer J. H. 69 (Y F)
 Pifano, F. & Diaz, E. 639 (Tryp)
 — with Mayer 640 (Tryp)
 Pih Gang Hoo, 711 (Mal)
 Pinkerton, H. & Henderson, R. G. 533 (Misc)
 — & Wernman, D. 335 (Misc)
 M. 409 (Mal)
 W. 163 (Rab)
 Pnam, D., with Monacelli, 57 (Y & S.)
 Pinnillo, G. 3rd (Mal)
 Pock Steen, P. H. 13 (Sp)
 Pogodina, E. A. & Sokolov A. G. 510 (Mal)
 Pons, L. M., with Vibo & Gay 728 (Misc.)
 Porter R. J. & Huff, C. G. 613 (Mal)
 Poynton, J. O. 153 (Hel)
 Pradhan, K. V. & Patwardhan, V. G. 659 (Vms)
 Prendergast, J. J. 463 (Lep)
 Proska, H. O., with Boyd, 563 (Mal)
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 Puri, I. M., 359 (B R.)
 — with Afendi, 103 (Mal)

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- Radaody-Ralarooy P. 84 (Dae)
 — & Gandon, P., 151 (Hel)
 — with Gailbird 84 (Dae.)
 Raden Sardjono Dhanodibroto, with van Veen, 402 (Hel)
 Rahman, S. A. & Zaeh, M. A., 667 (Misc)
 Raj V. P., with Cochrane, Rajagopalas & Senra, 703 (Lep)
 Rajagopalan, G., with Cochrane, Senra & Raj 703 (Lep)
 Ramakrishna, V., with Venkat Rao, (561) (Mal)
 Ramamurti, B., with Moosa, 519 (Hel)
 Raman, T. N., 290 (Mal)
 Ramirez, E. with Rivero 563 (Mal)
 Ramsey G. C. & Anderson, I. R., 232 (Mal)
 Randle T. A., (233) (Mal)
 Rao, H. R., with Russell, 559 (Mal)
 Rao, P. K. 663 (Vms)
 Rao, R. S. & Ganapathi, K. 541 (Misc)
 Rao, S. B., 620 (Pl)
 Rao, S. S. 513 (Hel)
 — & Mapleton, P. A., 152 (Hel)
 — with Napier & Das Gupta, 521 (Hel)
 Rao T. R. with Russell, 226, 612 (Mal)
 — with — & Knipe, 564 (Mal)
 Rappaport, I. with Kozul, 115 (Hel)
 Ratsagnawara, A. N., with Venkatesh-alam, 663 (Bl)
 Ravenel, S. F. & Smith, D. L., Sr. 600 (Dys)
 Ray H. N. & Idnana, J. A. 433 (Fev)
 Reardon, L. V., 563 (Am.)
 Reed, A. C. 291 (Mal) (423) (Misc)
 Reih, E. with Andrea Urta, J., & Andrea Urta, F. 573 (Lesh)
 Reilly L. V. with Wilson, 211 (Chi)
 Roser, R. with Hanes, 399 (Sp)
 Rostler R. & Marburg, K., 290 (Dys)
 Rensinger P. & Bailey J. 160 (Rab)
 Renna, A. T. with Pakenham-Walsh, 221 (Mal)
 Roys, D. 350 (Misc)
 Raynes, V. 660 (Fev)
 Rhoads, C. P. with Erf, 399 (Sp)
 Rhodes, A. J. with Ladian & Batchelor 663 (Fev)
 Rhoda, K. with Sawitz, d'Antoni & Lob 523 (Hel)
 Ribeiro, F., 29 (Lep)
 Richards, W. with MacGregor & Loh, 349 (Misc)
 Rintorath, A. & Dao van Ty (696) (Fev)
 Rita, G. 714 (Mal)
 Rivaa, C. I. with Vmo, 237 (Misc)
 Rivero & Ramirez, E. 568 (Mal)
 Ro, M. with Yokoyama, 47 (Hel)
 — with — Wakasaka & So, 47 *lus* (Hel)
 — & Yagawa, H. 230 (Mal)
 Robb, D. 471 (Hel)
 Roberts, A. (227) (Pl)
 Roberts, J. L., 30 (Mal)
 Robertson, R. C., 42 (Hel) 103 501 (Mal)
 Robinson, S. Drill, D. B. Wilson, J. W. & Nielsen, M. 671 (Misc)

- Roca-Garcia, M., with Bugher Bosbell
Marrigue & Gilmore, 434 (Y.F.)
— with Smith, Gast Galvis & Calderón
Cuervo 70 (Y.F.)
Rodanicho, E. C., with Nutter & Palmer 595
(Am.)
Rodová, H., with Jirovec, 733 (Misc.)
Rodríguez, J. N. & Wade, H. W., 220 (Lep.)
— with — 221 (Lep.)
Rodríguez Molina, R., 14 (14) (Sp.)
Rodríguez Ollerós & Hernández Morales, F.
15 (Sp.)
Roe, M. A., with Kitchen & Huff, (36) (Mal.)
Roe O 18 (Sp.)
Rogers, L., 707 (Lep.)
— Cook, J. H. & Muir E. 20 (Lep.)
Romiti, C., (153) (Hel.)
Rose H. M. & Culbertson, J. T. 111 (Hel.)
Rose, A. O. F. 78 (Tryp.)
Rose, J. F. with Hahn, Bale & Whipple, 116
(Hel.)
Rothman M. M. & Epstein, H. J., 594
(Am.)
Rottmann, A. 660 (Vms.)
Row R. Ambegankor S. D. & Bhende
Y. M. 479 (R.B.F.)
Roy A. C. Mazumdar D. C. & Mukherjee,
P., 421 (Misc.)
Roy D. N. (581) (Mal.)
— with Chopra & Ghosh 234 565 645
(Mal.)
— & Ganguly S. K. 532 (Misc.)
— & Ghosh, S. M., 531 (Misc.)
— with Strickland 532 (Misc.)
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Ruge H., 199 (Fev.)
Ruiz, H. with Kumm & Komp (352) (Misc.)
Ruiz-Castaneda, M. 687 (Fev.)
Russell, P. F. 410 (Mal.)
— & Knipe, F. W. 645 (Mal.)
— & Rao T. R. 584 (Mal.)
— with Mulligan, 338 (Mal.)
— with — & Mohan, 646 (Mal.)
— & Rao T. R. 228 559 642 (Mal.)
- Sabadini, L. & Imbert, M. 39 (Hel.)
Sabin, A. B. 533 (Misc.)
— & Ruchman, L., 161 (Rab.)
Sáenz, B., with Triana, J. G. & Armenteros,
J. A. 87 (Der.)
St. Martin, R. J. with Silverman, 273 (Am.)
Saleon, G. 304 (Tryp.) 432 (Y.F.)
Sahit, P. W. 724 (Oph.)
Sallam, H., 575 (Lesh.)
Salmond, M. D., with Cochrane & Paniraj
27 (Lep.)
Selvén, H. A. & Kobro M., 17 (Sp.)
Samuelson, S. with Freund 538 (Misc.)
Senders, J. P. & Dawson, W. T. (34) (Mal.)
Sandground J. H. 382 (Hel.)
— & Bonne C. 383 (Hel.)
Sanford, C. H. Crawford, P. T. & Warr O. S.
337 (Mal.)
Sangiovanni, V. 201 (Fev.)
Sanjiva Rao R. with Anderson, Pandit &
Shortt, 454 (Fev.)
- Santra, I. with Cochrane, Rajagopalan &
Raj 703 (Lep.)
— with Lowe, 21 (Lep.)
Sapocan, 237 (Misc.)
Sapre, S. N. (543) (Misc.)
Sardjito 224 (702) (Lep.)
Sarkar J. with Chatterjee 583 (Chl.)
Sarkar N. with Linton, 602 (Vms.)
Sarkar S. K. 644 (Mal.)
Sati, M. H. with Kirk, 200 261 2573 (Lesh.)
de Savitsch E. 521 (Hel.)
Sawada, T. with Ishii & Shimizu 254 258
(Lesh.)
Sawitz, W. 156 (Hel.)
— with d. Antoni, 158 (Hel.)
— Rhude, K. & Lob S., 523 (Hel.)
Sawyer K. C. Liggett, R. S. & Day H. W.
527 (Hel.)
Schaafsma, A. W. with Grassett, 680 (Vms.)
Schilling, V. 199 (Fev.)
Schrek, R. with Freeman & Brown, 591 (Am.)
Schuhardt V. T. 99 (R.F.)
Schneemann W. 35 (Mal.)
— & Spies, K. 294 (Mal.)
Schwartz, W. F., with Cole DeOreo Driver &
Johnson, 178 (Mal.)
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Scribner E. J. with Krueger 586 (Chl.)
Sen, B. with Chopra & Hayter 34 (Mal.)
— with — & Talukdar 34 (713)
(Mal.)
Sen, G. N., with Napier 574 (Lesh.)
Sen, P. 706 (Lep.) 711 (Mal.)
Senekji, H. A. & Beattie, C. P. 576 (Lesh.)
Sen Gupta, P. C. & Napier L. E. 239 (Diet.)
Sergeant, E. 172 (Vms.)
Severn, A. G. M. 619 (Pl.)
Shaby J. A. with Hoff 56 (Y. & S.)
Shaffer B. with Beerman, (80) (Tryp.)
Shah, I. A. with Afridi & Ma'jid, 105 (Mal.)
Shannon, R. C. & de Andrade G. C. 229 (Mal.)
Sha Shi-Nan, with Kasahara, 496 (Rab.)
Sheldon, A. J. with Brown & Thurston, 523
(Hel.)
Shen, T. H. with Huang & Tang, 579 (Chl.)
Shimizu S. with Ishii & Sawada, 254 258
(Lesh.)
Shindo M. 603 604 (Bb.)
Shortt, H. E. with Anderson, Pandit &
Sanjiva Rao 454 (Fev.)
— & Menon, K. P. 338 bis (Mal.)
— & Iyer P. V. S. 413 (Mal.)
Shute P. G. 178 (Mal.) 530 (Misc.)
— with Sinton, (186) (Misc.)
Sicé A. & Brochen, L., 68 (Y.F.)
Siddons, L. B., with Das Gupta, 715 bis (Mal.)
de Silva, K. J. L. 345 (Oph.)
Silva, R. with Castañeda, 448 (Fev.)
— with — & Monnier 448 (Fev.)
— & Ochoa R. R. 652 (Fev.)
Silverman, D. N. & St. Martin, R. J. 273
(Am.)
Silverman, J. with Greenman (466) (Lep.)
de Simon D. S. 456 (Lep.)
Simons, R. D. G. P. 732 (Misc.)
Simpson, R. E. H. 398 (Pel.)
Sima, R. A. H., with Zwemer & Coggeshall,
336 (Mal.)

- Senger E., 679 (Fev)
 Singh, B. H. 600 (Dys)
 Singh, J. & Singh, H. 294 *ter* (Alas)
 Sinha, G. N. (51) (Y & S)
 Sinnadurai, C. 53 (Y & S)
 Sinton, J. A. 360 (B R)
 — with Christophers & Covell, 360 (B R)
 — & Shute, P. G. (186) (Misc)
 Sison, A. B. M. & Ferrus, E. N. 284 (Bb)
 Skanala, J. B. 28 (Lep)
 Skrabon, K. 153 (Hel)
 Sloan, N. R. 706 (Lep)
 Sloan, T. B. M. with Cochrane, (463) (Lep)
 Smith, D. J. W. 690, (690) (Fev)
 — with Derrick & Brown, 447 (Fev)
 — with Freeman Derrick Brown & Johnson, 206 (Fev)
 Smith, D. L. with Ravenel, 600 (Dys)
 Smith, D. T. with Smith, S. G. & Callaway 718 (Fv)
 Smith, R. C. 66 (Y F)
 Smith, H. H. Roca Garcia, M. Gast Galva, A. & Calderón Cuervo, H. 70 (Y F)
 Smith, R. O. A. Harker K. C. & Ahmed, I. 256 (Lesh)
 Smith, S. G. Smith, D. T. & Callaway L. J. 718 (Fv)
 Smithburn, K. C. Mahaffy A. F. & Paul, J. H. 416 (Misc)
 Smithers, R. with Emlyson & Grubler 206 (Fev)
 Soapper, I. Chung, H. L. Chu, I. & Chan, H. C. 480 (Lept)
 Sooth, P. A. T. 67 (Y F)
 Snyder, J. C. with Liu & Endera, 681 (Fev)
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